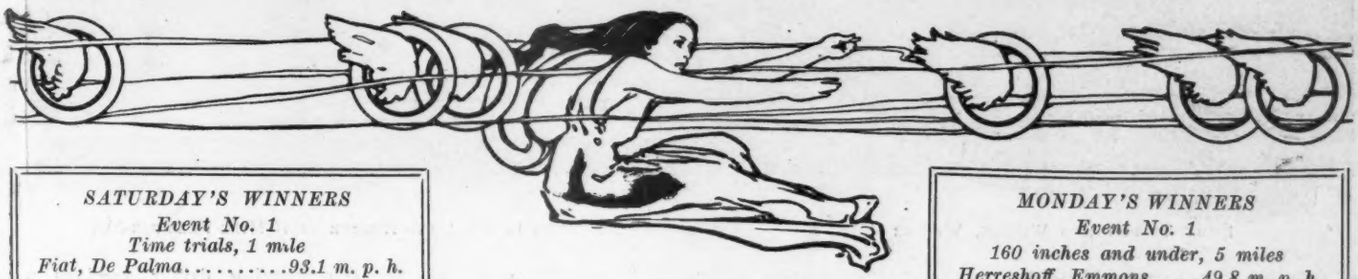
VOL. XVII. No. 10 CHICAGO, SEPTEMBER 8, 1910 $3.00 PER YEAR

MOTOR AGE

CURTAIN DROPS AT INDIANAPOLIS SPEEDWAY



SATURDAY'S WINNERS

Event No. 1
Time trials, 1 mile
Fiat, De Palma.....93.1 m. p. h.

Event No. 2
160 inches and under, 5 miles
Herreshoff, Emmons.....47.3 m. p. h.

Event No. 3
161-230 class, 5 miles
Cole, Edmunds.....58.9 m. p. h.

Event No. 4
231-300 class, 5 miles
Marmon, Harroun.....65.2 m. p. h.

Event No. 5
301-450 class, 5 miles
National, Aitken.....73.1 m. p. h.

Event No. 6
451-600 class, 5 miles
National, Wilcox.....72.8 m. p. h.

Event No. 7
Free-for-all, 10 miles
Benz, Hearne.....85 m. p. h.

Event No. 8
Free-for-all, 100 miles
Benz, Hearne.....75 m. p. h.

Event No. 9
Free-for-all, handicap, 5 miles
Cole, Edmunds.....59.6 m. p. h.

Event No. 10
Remy brassard race, 100 miles
National, Wilcox.....72.2 m. p. h.

INDIANAPOLIS, Ind., Sept. 5—Racing on the 2½-mile motor speedway for the season of 1910 came to an end this afternoon when Johnny Aitken, in the National, finished in the darkness, the winner of the 200-mile free-for-all, for which he pulled down a purse of $1,000. In winning this long grind, Aitken broke into the stellar ranks along with his teammate Wilcox, Eddie Hearne and Ralph de Palma, who put plenty of ginger into the sport, which started Saturday afternoon and concluded today. No stock-car records were broken, but the contests were spirited, and in the free-for-alls the big Benz and the larger Fiat stirred the blood of the onlookers by their terrific bursts of speed. Getting down to the long grinds, Wilcox landed the 100-mile race of Saturday for the Remy trophy, while Aitken got the double century today. Good crowds were out for both days and no accidents marred the sport.

Racing at Indianapolis this year has been remarkable in that a new set of records has been established during the season, due, no doubt, to the magnificent brick surface that replaced the first one laid. For stock-car racing this track has proved ideal, it having been demonstrated that it is safe. There have been few accidents during the meets themselves, and outside of Lytle no one has been injured. Poor Kincade was killed after the July meeting, but that was in practice, and no one knows

MONDAY'S WINNERS

Event No. 1
160 inches and under, 5 miles
Herreshoff, Emmons.....49.8 m. p. h.

Event No. 2
161-230 class, 5 miles
Firestone, Frayer.....62.7 m. p. h.

Event No. 3
231-300 class, 5 miles
Marmon, Harroun.....64.7 m. p. h.

Event No. 4
301-450 class, 5 miles
National, Aitken.....72 m. p. h.

Event No. 5
451-600 class, 5 miles
National, Wilcox.....72.2 m. p. h.

Event No. 6
Handicap, 5 miles
McFarlan, Barndollar....58.4 m. p. h.

Event No. 7
Free-for-all, 10 miles
Fiat, De Palma.....88.1 m. p. h.

Event No. 8
Free-for-all, 50 miles
Benz, Hearne.....78.8 m. p. h.

Event No. 9
Free-for-all, 200 miles
National, Aitken.....71.4 m. p. h.

INDIANAPOLIS RECORDS TO DATE

STOCK CAR RECORDS

FIVE MILES

Class	Car and Driver	Time	M.P.H
451-600,	Knox, Oldfield.....	4:01.36	74.6
301-450,	National, Kincade...	4:05.76	73.4
231-300,	Marmon, Dawson....	4:16.00	70.3
161-230,	Buick, Chevrolet.....	4:40.81	64.2
Under 230,	Herreshoff, Roberts.	5:22.88	55.8

TEN MILES

Under 600,	Buick, Burman...	8:14.00	72.8
451-600,	Knox, Oldfield.....	7:50.75	76.5
301-450,	National, Aitken.....	7:55.12	75.7
231-300,	National, Aitken....	8:04.83	74.3
161-230,	Buick, Chevrolet.....	8:55.40	67.2
Under 160,	Herreshoff, Roberts.	5:22.88	55.8

TWENTY MILES

Under 600,	Buick, Burman....	16:02	72.7
301-450,	Marmon, Dawson....	15:01	79.9
231-300,	Marmon, Dawson....	15:55.24	75.3

FIFTY MILES

Under 600,	Marmon, Harroun.	39:27	76.0
301-450,	Marmon, Dawson....	40:28	74.1
231-300,	Marmon, Dawson....	40:29.02	74.2

INDIANAPOLIS RECORDS TO DATE

STOCK CAR RECORDS

ONE HUNDRED MILES

Under 600,	Marmon, Dawson.	82:15.24	72.9
301-450,	National, Kincade...	83:43.12	71.7
231-300,	Marmon, Dawson....	82:22.97	72.8

TWO HUNDRED MILES

Under 600,	Marmon, Dawson.	163:20.14	73.4

FREE-FOR-ALL RECORDS

Distance	Car and Driver	Time	M.P.H
1,	Benz, Oldfield	:35.63	101.0
5,	Fiat, De Palma	3:29.06	86.1
10,	Fiat, De Palma	6:43.30	88.2
15,	Benz, Hearne	10:25.17	86.4
20,	Benz, Hearne	14:06.72	85.1
25,	Benz, Hearne	18:56.84	79.1
30,	Benz, Hearne	22:47.45	79.0
40,	Benz, Hearne	30:21.62	79.0
50,	Benz, Hearne	38:02.85	78.6
100,	Marmon, Harroun	79:33.00	75.4
150,	Marmon, Harroun	122:16.00	73.5
200,	Marmon, Harroun	166:32.00	72.0

Wilcox, National; Hearne, Benz

records have been taken away from the Marquette-Buicks cars which won.

century in 1:20:35.64. The second time it went to Wilcox in the National, who will hold it until next year. Besides the

REMY TROPHY AND WILCOX, WINNER

FINISH OF DE PALMA IN NO. 1 AND HEARNE IN 10-MILE FREE-FOR-ALL

to this day just how it occurred. As for the speed of the track, Barney Oldfield has given it a hall mark that seems to defy all efforts. In May, Oldfield and his big Benz shoved the mile mark down to :35.63, equal to 101 miles an hour. This has stood, and in consequence Oldfield gets the gold Overland which was hung up as a prize to go to the holder of the mile record at the end of the year.

There have been three meetings this summer. The first was in May, taking in Decoration day; the second came in July and worked in the national holiday, while the third and final one included Labor day. Featured in these meets were several trophy contests, six, to be exact, chief of which was the Wheeler & Schebler trophy, valued at $10,000, which was raced for only once. That was in May, and the winner was Ray Harroun, driving the six-cylinder Marmon Wasp, who will hold the cup over the winter. The Schebler cup race was at 200 miles and was for free-for-all cars under 600 cubic inches piston displacement. Harroun made the double century in 2 hours 46 minutes 32 seconds. The Prest-O-Lite trophy, for stock cars of from 301 to 450 cubic inches piston displacement, at 100 miles, was run for but once, and that in May, when it was won by Tom Kincade, now dead, who drove his National the century in 1 hour 23 minutes 12 seconds. The G & J trophy, another one of the classics, was up for competition in July, when it was won by Burman in the Marquette-Buick. This was at 50 miles, for 231-300 class cars, and Burman did the distance in 40:03.08. It has been generally supposed that when the A. A. A. disqualified the Marquette-Buicks for not being stock, that the trophy won by Burman would revert to the second-place winner, Pearce in the Falcar, but, according to Chairman Butler, this is not so. Only the

The feature of the July meeting was the race for the Cobe cup, the trophy contested for in 1909 in the Crown Point road races of the Chicago Automobile Club, and which first was won by Chevrolet in a Buick. The Chicago club did not desire to renew its road races, so the trophy was converted into a speedway cup, for stock cars under 600 cubic inches piston displacement, at 200 miles. This race was held on July 4 and was won by Dawson in a Marmon, who turned the distance in 2 hours 43 minutes 20.14 seconds.

The Remy trophy and brassard has been run twice this year, first at the July meet and again last Saturday. This is at 100 miles, and the first winner was Burman in the Marquette-Buick, who turned the trophy, the winning driver receives a salary of $75 a week as long as he defends his title. Somewhat similar is the motor speedway helmet, which is worth $50 a week to the winning driver. This is offered in a free-for-all and has been run for three times this year. The first time, in May, it was at a distance of 5 miles and was won by Burman in a Buick, who turned the distance in 3:37:24. In July Eddie Hearne in his big Benz won it in a 10-mile race, which was done in 7:13:00. Hearne liked the rich plum so well that he went after it again last Saturday, winning it handily in another 10-mile race. He now is the holder of the helmet. It is expected that next season the competition for all six speedway trophies will be keen.

TABLE SHOWING INTERMEDIATE TIMES IN 100-MILE FREE-FOR-

No.	Car	Driver	Cyls.	Bore	Stroke	10	20
3	Benz	Hearne	4	6 1/10	8	7:56.23	15:47.28
27	Westcott	Knight	4	4¾	5	8:37.09	16:48.21
7	National	Livingstone	4	5	5 11/16	8:05.99	16:05.35
32	Marmon	Harroun	4	4½	5	8:36.65	16:50.47
15	Falcar	Pearce	4	4⅛	5¼	9:17.91	18:02.07
16	Falcar	Gelnaw	4	4⅛	5¼	9:08.72	18:05.54
14	Matheson	Basle	6	4½	5	9:37.80	26:15.94
36	American	Jenkins	4	5⅜	5½	8:35.94	16:47.80
31	Firestone-Columbus	Frayer	4	4½	5	10:07.94	Out
10	Marmon	Dawson	4	4½	5	3 laps	6:02.77
8	National	Aitken	4	5	5 11/16	2 laps	4:10.74

* Out in 39th lap † Out in 38th lap

TABLE SHOWING INTERMEDIATE TIMES IN 100-MILE REMY

No.	Car	Driver	Cyl.	Bore	Stroke	10	20
9	National	Wilcox	4	5	5 11/16	8:30.40	16:49.03
11	National	Merz	4	5	5 11/16	8:42.36	17:03.51
5	Speedwell	Clemens				8:37.20	17:02.68
29	Midland	Ireland	4	4½	5	9:29.72	18:42.71
24	McFarlan	Clemens	6	3⅝	4	9:40.35	18.59.39
28	Black Crow	Stinson	6	4 5-16	4⅞	9:40.88	19:00.26
23	McFarlan	Barndollar	6	3⅝	4	12:20.62	21:46.20
34	Cino	Fritsch	4	4⅜	5	9:53.93	19:43.54
14	Falcar	Pearce	4	4⅛	5¼	10:27.80	29:35.19
10	Marmon	Dawson	4	4½	5	8:30.84	16:49.56
31	Firestone-Columbus	Frayer	4	4½	5	11:59.83	Out

Prominent In First Day's Racing

INDIANAPOLIS, Ind., Sept. 3—Although no records were broken in the first day's races of the 2-day meet which marked the closing of motor car competition at the Indianapolis speedway for the season of 1910, considerable interest was shown and some remarkable performances were made in the two 100-mile events in which Eddie Hearne in a Benz and Howard Wilcox in a National were the shining lights.

The 100-mile free-for-all was won by Hearne in the 120-horsepower Benz. The prizes in this event were $1,000 to the winner, $500 for second place, $200 for third and $100 for fourth. This event brought out a dark horse. Harry Knight, an Indianapolis lad 20 years old, in a Westcott, burst into the limelight when he showed his heels to a classy field and came second to Eddie Hearne's big Benz. Hearne's time for this century event was 1 hour 10 minutes 58.1 seconds, which is 25.1 seconds slower than the speedway record established on this track by Harroun in a Marmon. Knight's Westcott crossed the tape 4 minutes behind the winning Benz, and Al Livingstone, hero of the recent Illinois trophy race at Elgin, was third, in a National.

The Westcott's performance in this event is remarkable for the fact that not a single stop was made throughout the race. Hearne stopped for 24 seconds in the thirty-fourth lap to take on oil, and it is interesting to note that though he set the pace the entire distance, his tires were in excellent condition at the end. Two stops were made by Livingstone, each of which consumed more than a minute and a half, the first being in the thirteenth lap on account of a blown-out right rear tire, and the second in the twenty-fifth lap for a right front tire and water. Similar tire trouble was encountered by Harroun, who was fourth, the changes being made in the eighteenth and thirty-fifth laps. Creditable performances also were made in this race by the Falcars, which had already competed in two previous events. Pearce lost about 3 minutes in the twenty-fifth lap repairing a broken ignition cable, and Gelnaw lost 2 minutes in the twelfth lap replacing a spark plug.

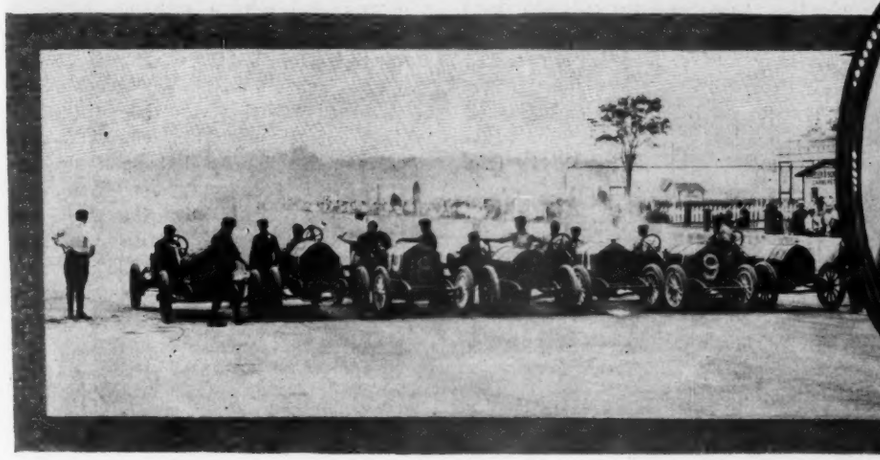
There were eleven starters in the Remy grand brassard event at 100 miles, and the six cars that finished made non-stop runs. Wilcox in a National was first in this event, with his team-mate, Merz, second; Clemens in a Speedwell was third; Ireland, Midland, fourth; Stinson, Black Crow, Fifth, and Clemens in a McFarlan, sixth. Joe Dawson in a Marmon, victor of this year's Cobe trophy, led the field in this event for many laps, and it was nip and tuck between him and Wilcox until he suffered engine-bearing trouble and went out in the twenty-fifth lap. With Dawson to the mat, the two Nationals had the race well in hand, though Clemen's Speedwell clung like a wolf on their trail.

As for the other events: In the time trials, the nearest that de Palma could come to the record hung up by Oldfield in the big Benz was a mile in 38.64, with the 200 horsepower Fiat, and 40.20 in the 90-horsepower machine of the same make.

In event No. 2, 5 miles, a race between three Herreshoffs, Emmons was first and Smith second.

Edmunds in a Cole 30 was winner of the third event, 5 miles, class B, with Keifer in a Staver and Endicott in another Cole close contenders for second place.

Harroun won the laurels in event No. 4, 5 miles, but was closely pressed by Pearce in a Falcar, while Gelnaw's Falcar was third. In the fifth event, Aitken was the shining



START OF EVENT NO. 4, MONDAY, 5 MILES, 301-450 CLASS CARS

AITKEN, WINNER 200-MILE FREE-FOR-ALL

ALL ON SATURDAY WHICH WAS WON BY HEARNE IN 120 BENZ

30	40	50	60	70	80	90	100
23:49.75	32:00.67	39:95.67	47:15.10	55:24.94	1:03:21.82	1:11:48.76	1:19:58.09
25:06.79	33:24.09	41:39.76	49:55.75	58:10.55	1:06:23.59	1:14:43.39	1:23:01.52
23:58.89	33:54.48	41:34.20	49:16.64	58:40.90	1:06:31.09	1:15:23.89	1:24:50.15
24:44.25	32:29.85	42:04.91	49:53.61	57:38.29	1:05:20.02	1:15:52.32	1:25:27.60
27:28.09	38:32.65	47:20.49	55:58.37	1:04:21.54	1:12:51.78	1:21:20.02	1:27:40.49
27:04.11	36:02.92	45:01.48	53:57.96	1:06:30.33	1:15:24.66	1:24:19.30	*
34:38.57	42:52.31	51:08.80	59:81.25	1:07:57.01	1:16:24.14	1:24:51	†
24:46.87	36:35.03	44:16.70	56:17.41	1:04:17.56	1:12:07.51	1:23:25.96	†

BRASSARD RACE ON SATURDAY, WON BY WILCOX IN NATIONAL

30	40	50	60	70	80	90	100
25:37.34	33:33.21	41:23.16	49:31.66	58:05.14	1:06:42.63	1:14:53.30	1:23:03.56
25:29.78	33:43.17	42:01.65	50:18.30	58:33.36	1:06:44.05	1:14:56.24	1:23:12.51
25:43.80	35:04.85	43:22.92	51:52.46	1:31:00.01	1:08:38.96	1:17:01.10	1:25:11.19
27:45.68	36:54.47	45:58.77	55:02.36	1:03:02.36	1:13:02.60	1:22:04.68	1:31:14.54
28:09.94	37:19.14	46:27.68	55:48.56	1:04:50.39	1:13:48.89	1:22:47.11	1:31:24.44
28:10.27	40:04.36	49:11.81	58:08.56	1:07:03.59	1:16:02.97	1:24:59.12	1:35:17.24
31:14.35	40:42.40	50:09.55	59:34.49	1:08:56.89	1:18:22.92	1:27:43.35	*
29:40.43	39:25.44	49:12.54	59:09.75	1:09:10.25	1:19:17.94	1:29:28.21	†
37:52.25	46:11.30	54:26.89	1:02:39.17	1:10:50.81	‡		
25:28.07	33:30.61	41:23.70	49:32.55	§			

* Out in 38th lap † Out in 37th lap ‡ Out in 31st lap § Out in 25th lap

light, with Dawson's Marmon second and Greiner's National third.

Wilcox was the bright star in the sixth event, second and third places going to Greiner and Merz, respectively.

Hearne made his first appearance in event No. 7, which he won easily.

SATURDAY'S SUMMARIES

EVENT 1, CLASS D, MILE RECORD TRIALS

No.	Car	Driver	Time
1	Fiat	200, DePalma	38.64
2	Fiat	90, DePalma	40.20

EVENT 2, CLASS B, STOCK CHASSIS, 160 INCHES AND UNDER, DISTANCE 5 MILES

No.	Car	Driver	2½ miles	5 miles
19	Herreshoff,	Emmons	3:27.22	6:20.48
21	Herreshoff,	Smith	3:24.71	6:21.19
20	Herreshoff,	McCormick	4:01.35	8:04.80

EVENT 3, CLASS B, STOCK CHASSIS, 161-230 CLASS. DISTANCE 5 MILES

No.	Car	Driver	2½ miles	5 miles
6	Cole.	Edmunds	2:31.28	5:05.50
17	Staver,	Keifer	2:40.25	5:07.20
33	Cole.	Endicott	2:51.21	5:07.79
35	Hudson,	Olin	3:05.14	

EVENT 4, CLASS B, STOCK CHASSIS, 231-300 CLASS. DISTANCE 5 MILES

No.	Car	Driver	2½ miles	5 miles
26	Marmon,	Harroun	2:25.82	4:35.66
15	Falcar,	Pearce	2:26.28	4:35.95
16	Falcar,	Gelnaw	2:20.76	4.41.49
22	Marmon,	Dawson	2:32.44	4:41.85
37	Great Western,	Endicott	2:31.80	4:50.56
34	Cino,	Fritsch	2:33.40	4:56.54
24	McFarlan,	Clemens	2:39.45	4:58.25
23	McFarlan,	Barndollar	2:42.87	5:08.62

EVENT 5, CLASS B, STOCK CHASSIS, 301-450 CLASS. DISTANCE 5 MILES

No.	Car	Driver	2½ miles	5 miles
9	National,	Aitken	2:11.02	4:05.97
10	Marmon,	Dawson	2:11.64	4:07.56
18	National,	Greiner	2:16.70	4:14.97
11	National,	Merz	2:14.30	4:15.37
5	Speedwell,	Clemens	2:18.15	4:17.31
15	Falcar,	Pearce	2:20.09	4:22.91
16	Falcar,	Gelnaw	2:27.26	4:41.50
29	Midland,	Ireland	2:32.74	4:52.54
31	Firestone-Col.,	Frayer	2:38.80	4:59.14

EVENT 6, CLASS B, STOCK CHASSIS, 451-600 CLASS. DISTANCE 5 MILES

No.	Car	Driver	2½ miles	5 miles
9	National,	Wilcox	2:11.50	4:06.75
18	National,	Greiner	2:12.31	4:07.51
11	National,	Merz	2:16.57	4:18.10
14	Matheson,	Basle	2:18.18	4:19.79

EVENT 7, CLASS D, FREE-FOR-ALL, SPEEDWAY HELMET. DISTANCE 10 MILES

No.	Car	Driver	5 miles	10 miles
3	Benz,	Hearne	3:36.74	7:03.41
7	National,	Merz	4:02.17	7:47.05
2	Fiat 90,	DePalma	4:29.07	8:02.52
8	National,	Aitken	3:57.22	8:06.12
14	Matheson,	Basle	4:18.10	8:24.94

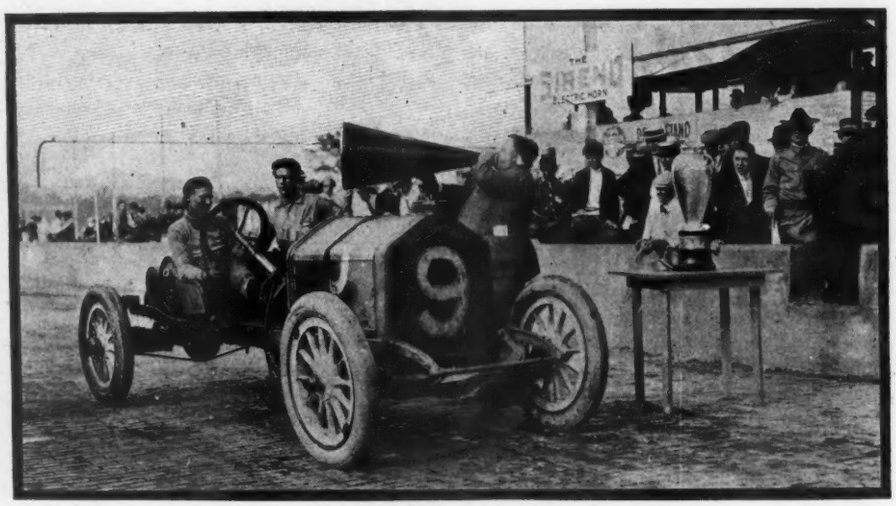
EVENT 9, CLASS D, FREE-FOR-ALL HANDICAP. DISTANCE 5 MILES

No.	Car	Driver	Handicap Seconds	Time 5 miles
6	Cole,	Edmunds	108	5:01.66
14	Matheson,	Basle	20	5:16.74
24	McFarlan,	Clemens	108	5:20.51
27	Westcott,	Knight	20	5:23.30
29	Midland,	Ireland	90	5:26.01
25	Parry,	Hughes	90	5:29.35
34	Cino,	Fritsch	90	5:32.88
18	National,	Greiner	Scr.	5:35.21
37	Great Western,	Endicott	80	5:36.24
33	Cole,	Endicott	108	5:38.94
28	Black Crow,	Stinson	80	5:42.94
11	National,	Merz	Scr.	5:46.21
19	Herreshoff,	Emmons	124	5:48.74
21	Herreshoff,	Smith	124	5:50.85
23	McFarlan,	Barndollar	108	6:03.32

Aitken, National and De Palma, Fiat

INDIANAPOLIS, Ind., Sept. 5—The powers that be surely were lenient to the crowds that thronged the Indianapolis motor speedway to witness the closing events of the season, but notwithstanding the fact that a heavy downpour of rain occurred shortly before the time for which the first event was scheduled, the weather soon cleared up and remained favorable throughout the afternoon, leaving the track cool, a fact which notably improved the wearing efficiency of the tires.

The 200-mile race for cars of 600 cubic inches piston displacement or less was the feature event of the day, and at 3:30 o'clock Starter Wagner sent away the twelve starters. The first prize in this race was $1,000, second $500 and third $200, and in addition to this the Bosch company posted $300 as a first prize, $200 for second and $100 for third. Aitken in a National was the winner in this event with his team mate, Livingstone, second, while Barndollar in a McFarlan six, after getting first and fourth position in two previous events and making the only non-stop run in the race, finished third. A threatening cloudburst so enveloped the track in darkness near the finish of this race that much difficulty was experienced by Starter Wagner and the timers in bringing it to a successful close. The race was continued, however, until Greiner in a National came in fourth. Clemens in another McFarlan was on his last lap when the race was finished, while Stinson in a Black Crow also was running on his seventy-eighth lap. At 30 miles Aitken, Clemens and Harroun were fighting for the lead with Aitken two car lengths in front, while Livingstone and Dawson were having it out for fourth position. This is rather remarkable, because Aitken lost almost a minute in the fourteenth lap replacing a right front tire. At 40, 50 and 60 miles Harroun was in the lead, and although it



PRESENTATION TO WILCOX OF REMY TROPHY WHICH HE WON IN HIS NATIONAL

TABLE SHOWING INTERMEDIATE TIMES MADE IN THE 50

Driver	No.	Car	Cyls.	Bore	Stroke	5 M.
Hearne	3	Benz	4	6 1/10	8	3:50
Harroun	32	Marmon	4	4½	6½	5:00
Livingstone	7	National	4	5	5 11/16	4:06
De Palma	1	Fiat	4	.....	.....	3:53
Aitken	9	National	4	5	5 11/16	4:06
Basle	14	Matheson	6	4½	5	4:22
Knight	27	Westcott	4	4¾	5	4:22
Frayer	31	Firestone-Columbus	4	4½	5	4:39

* Out 15th lap

TABLE SHOWING INTERMEDIATE TIME MADE IN THE 200-MILE FREE-FOR-ALL MONDAY WHICH WAS

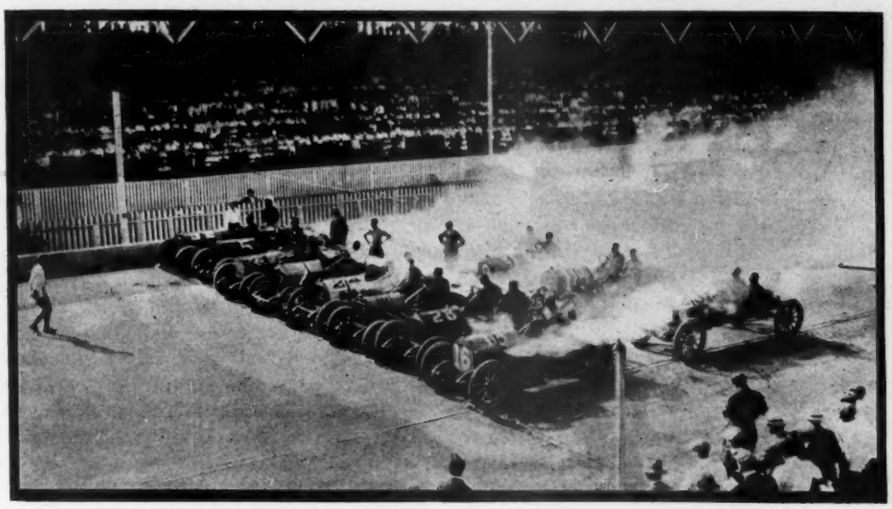
Car No.	Car	Driver	Cyls.	Bore	Stroke	10	20	30	40	50	60	70
9	National	Aitken	4	5	5 11/16	8:24.16	16:46.02	25:07.40	34:41.42	43:00.29	51:15.46	59:28.43
7	National	Livingstone	4	5	5 11/16	8:29.74	16:57.80	25:13.32	33:45.77	42:46.30	51:42.32	1:00:33.73
23	McFarlan	Barndollar	6	3⅝	4	9:34.07	18:43.93	27:50.42	36:52.05	45:51.94	54:46	1:03:43.13
18	National	Greiner	4	5	5 11/16	8:40.10	17:03.34	25:28.12	34:08.07	44:02.75	52:30.22	1:01:02.45
24	McFarlan	Clemens	6	3⅜	4	9:46.19	19:06.14	28:02.72	37:50.85	47:14.39	56:38.03	1:10:25.14
28	Black Crow	Stinson	4	4 5/16	4⅞	9:44.34	19:05.70	28:02.27	37:51	51:39.54	1:00:51.29	1:10:07.67
10	Marmon	Dawson	4	4½	5	8:30.41	16:58.17	25:19.67	33:46.10	43:56.43	52:03.65	1:01:32.70
32	Marmon	Harroun	4	4½	6½	8:34.29	16:45.25	25:08.76	33:02.56	41:00.85	49:20.69	57:36.03
5	Speedwell	Clemens	4	5	5	8:30.07	16:52.12	25:08.12	36:40.35	45:12.85	52:45.83	1:02:06.70
16	Falcar	Gelnaw	4	4⅛	5¼	10:36.98	20:07.72	37:42.25	49:28.92	58:44.45	1:08:05.44	1:17:28.30
14	Matheson	Basle	6	4½	5	8:56.35	17:25	25:50.23	34:30.75	47:38.89	56:17.37	1:04:55.19
29	Midland	Ireland	4	4½	5	9:45.84	19:08.14	28:46.57	38:25.82	47:59.45	57:21.57	1:06:47.95

* Running at finish † Was running on 78th lap at finish of race

Capture Big Events on Labor Day

was necessary for him to stop at the end of the twenty-ninth lap, he succeeded in establishing a new record for this distance of 75 miles, his time being 1:03:31.9, the previous record of 1:09:34.6 being held by Aitken in a National and made on this track. This stop of 2 minutes 15 seconds in which Harroun took on gasoline and oil and changed a right rear tire set him behind considerably, but at 100 miles he was again but a hundredth of a second behind the leader. From here on, however, Aitken held the lead, though Harroun was running second at 170 miles, after which Harroun dropped out in the back stretch.

One of the most interesting events of the day was the 50-mile free-for-all open race, which was won by Eddie Hearne in his big German Benz of 120 horsepower. Among the eight starters in this race were de Palma, in his 200-horsepower Fiat; Livingstone in a National, Aitken in a National, Basle in a Matheson, Knight in a Westcott, Frayer in a Firestone-Columbus, and Harroun in a Marmon, the prizes being $800 for first place, $400 for second and $200 for third. At the end of 10 miles Hearne led, having passed de Palma's Fiat after the first lap. De Palma was running a close second, however, with Harroun well up in third place, while both Aitken and Livingstone were trailing a mile behind. Hearne also held the lead at 20 miles, though closely pressed by Harroun's Marmon. De Palma began to lose time in the seventh lap, when he was compelled to stop and change a rear tire. Hearne practically had things his own way at 30 miles, de Palma and Harroun both being compelled to stop in the eleventh lap and change tires. These stops enabled Livingstone in a National to climb into second place, while Harroun was running third and de Palma fourth. Hearne was almost a lap to the good at 40 miles, though Harroun had regained second place and Livingstone was running third. De Palma suffered tire trouble again in the sixteenth lap. At the end of the race Hearne was still almost a lap in the lead, while Harroun in the Marmon was second, Livingstone's National third and de Palma's Fiat fourth.



START OF 200-MILE FREE-FOR-ALL MONDAY, WON BY NATIONAL

MILE FREE-FOR-ALL MONDAY, WON BY HEARNE IN BENZ

10 M.	15 M.	20 M.	25 M.	30 M.	35 M.	40 M.	45 M.	50 M.
7:34	11:22	15:06	18:56	22:47	26:38	30:21	34:13	38:02.85
7:43	11:26	15:07	19:01	24:23	28:04	31:56	35:47	39:32.47
8:03	11:59	15:50	19:43	23:42	27:53	32:09	36:34	40:57.09
7:38	11:25	16:53	20:47	24:36	28:09	33:56	37:40	41:17.22
8:03	11:58	15:49	19:42	24:51	28:40	35:11	39:17	43:19.52
8:29	14:41	18:50	22:57	27:04	35:38	39:52		
8:30	12:41	16:51	21:01	25:11	29:02	*		
9:51								

MONDAY'S SUMMARIES

EVENT 1, STOCK CHASSIS CARS, CLASS B. 160 CUBIC INCHES AND UNDER. DISTANCE 5 MILES

No.	Car	Driver	2½ M.	5 M.
19	Herreshoff,	Emmons	3:07.23	6:01.33
21	Herreshoff,	Smith	3:07.50	6:01.75
20	Herreshoff,	McCormick	3:28.50	.....

EVENT 2, STOCK CHASSIS CARS, CLASS B, 161 TO 230 CLASS. DISTANCE 5 MILES

No.	Car	Driver	2½ M.	5 M.
30	Firestone-Columbus,	Frayer	2:33.00	4:47.87
33	Cole,	Endicott	2:34.16	4:50.41
17	Stover,	Keifer	2:40.77	5:07.48

EVENT 3, STOCK CHASSIS CARS, CLASS B, 231 TO 300 CLASS. DISTANCE 5 MILES

No.	Car	Driver	2½ M.	5 M.
26	Marmon,	Harroun	2:29.67	4:38.27
15	Falcar,	Pearce	2:23.47	4:39.76
16	Falcar,	Gelnaw	2:30.67	4:45.20
23	McFarlan,	Barndollar	2:32.80	4:45.23
24	McFarlan,	Clemens	2:37.20	4:54.94
37	Great Western,	Endicott	2:36.87	4:59.87
34	Cino,	Fritsche	2:38.02	5:01.27
25	Parry,	Hughes	2:58.60	5:15.49
22	Marmon,	Dawson	2:33.27	.....

EVENT 4, STOCK CHASSIS CARS, CLASS B, 301 TO 450 CLASS. DISTANCE 5 MILES

No.	Car	Driver	2½ M.	5 M.
9	National,	Aitken	2:12.57	4:10.22
10	Marmon,	Dawson	2:13.23	4:10.56
18	National,	Greiner	2:12.50	4:10.90
4	Marmon,	Harroun	2:12.90	4:11.15
5	Speedwell,	Clemens	2:17.62	4:17.85
16	Falcar,	Gelnaw	2:26.22	4:39.68
31	Firestone-Columbus,	Frayer	2:26.99	4:42.07
15	Falcar,	Pearce	2:25.95	4:51.85
11	National,	Merz	2:27.54	.....
29	Midland,	Ireland	2:42.75	.....

EVENT 5, STOCK CHASSIS CARS, CLASS B, 451 TO 600 CLASS. DISTANCE 5 MILES

No.	Car	Driver	2½ M.	5 M.
9	National,	Wilcox	2:12.25	4:09.89
14	Matheson,	Basle	2:15.15	4:16.08
11	National,	Merz	2:15.62	4:16.54
18	National,	Greiner	2:17.95	4:17.68

EVENT 6, CLASS D, FREE-FOR-ALL HANDICAP, DISTANCE 5 MILES

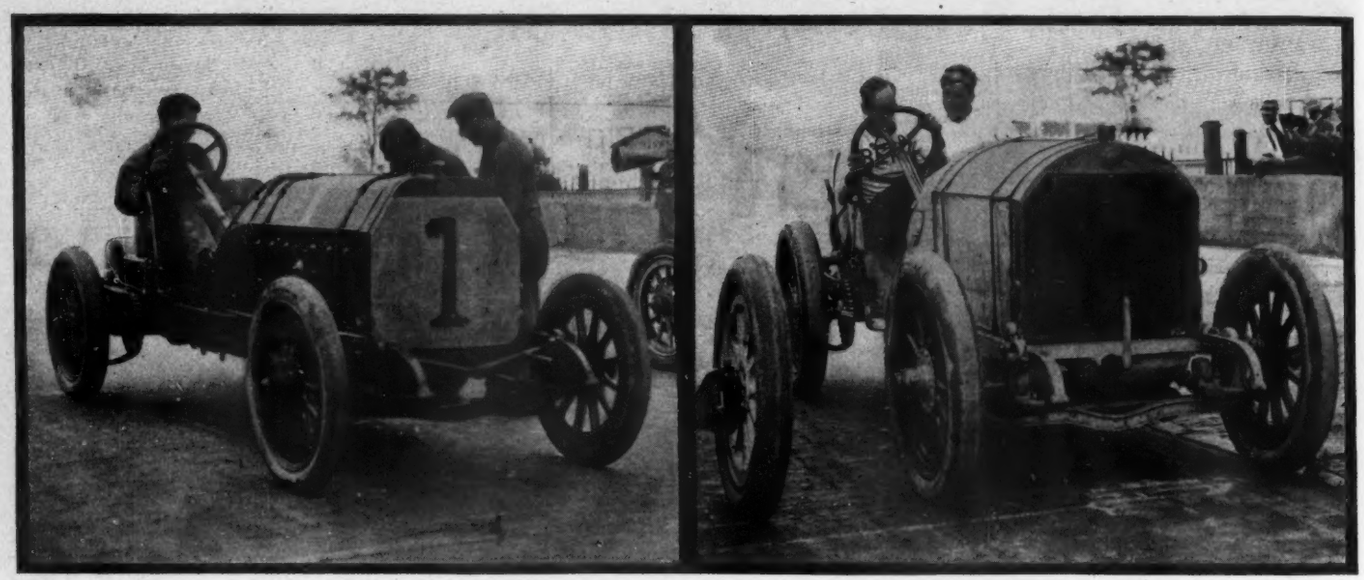
No.	Car	Driver	Seconds	5 M.
23	McFarlan,	Barndollar	50	5:08.32
30	Firestone-Columbus,	Frayer	40	5:09.65
24	McFarlan,	Clemens	20	5:13.65
6	Cole,	Edmunds	35	5:14.06
25	Parry,	Hughes	40	5:14.30
5	Speedwell,	Clemens	10	5:19.00
33	Cole,	Endicott	40	5:19.35
14	Matheson,	Basle	10	5:19.68
18	National,	Greiner	Sc.	5:23.20
11	National,	Merz	Sc.	5:28.40
19	Herreshoff,	Emmons	70	5:33.37
16	Falcar,	Gelnaw	25	5:35.42
37	Great Western,	Endicott	25	5:37.37
28	Black Crow,	Stinson	35	5:37.90
34	Cino,	Fritsch	35	5:40.93
29	Midland,	Ireland	35	5:41.35
21	Herreshoff,	Smith	70	.....

EVENT 7, CLASS D, FREE-FOR-ALL, OPEN RACE. DISTANCE 10 MILES

No	Car	Driver	5 M.	10 M.
1	Fiat 200,	De Palma	3:29.06	6:48.30
3	Benz,	Hearne	3:30.50	6:48.33
32	Marmon,	Harroun	4:05.45	7:59.60
7	National,	Merz	4:09.70	8:00.37
14	Matheson,	Basle	4:20.90	8:25.14
8	National,	Aitken	One lap	

WON BY JOHNNY AITKEN IN A NATIONAL WITH AL LIVINGSTONE, ALSO NATIONAL, IN SECOND PLACE

80	90	100	110	120	130	140	150	160	170	180	190	200
1:07:34.05	1:15:40.92	1:24:15.49	1:32:00.70	1:40:03.35	1:48:10.74	1:56:21.28	2:04:24.31	2:12:31.24	2:20:15.05	2:29:01.23	2:38:47.97	2:47:54.74
1:09:12.77	1:17:49.52	1:25:19.22	1:34:30.95	1:42:46.40	1:51:06.95	1:59:24.10	2:07:35.87	2:13:12.80	2:25:44.95	2:34:21.80	2:43:28.32	2:53:26.30
1:12:37.33	1:21:35.73	1:30:32.12	1:39:18.80	1:48:11.80	1:57:06.22	2:06:00.08	2:14:56.17	2:19:22.44	2:34:05.67	2:43:41.10	2:53:19.48	3:03:29.13
1:09:33.10	1:18:05.60	1:26:37.69	1:35:00.85	1:43:24.42	1:51:49.54	2:00:10.63	2:08:37.87	2:12:53.67	2:26:00.70	2:35:15.73	2:55:31.17	3:05:56.85
1:19:49.85	1:28:06.45	1:38:26.80	1:47:39.50	1:57:03.70	2:06:33.10	2:16:00.40	2:25:27.85	2:30:16	2:44:27.34	2:53:50	3:03:30.18	*
1:19:26.90	1:30:52.83	1:39:25.55	1:48:32.09	1:57:39.30	2:06:51.15	2:15:59.90	2:27:08.30	2:36:32.64	2:51:37.41	†		
1:11:22.07	1:19:27.80	1:27:47.90	1:35:48.92	1:43:48.80	1:51:48.15	1:59:47.17	2:07:45.14	2:20:29.48	2:30:10.17			
1:08:31.87	1:16:12.72	1:24:15.50	1:32:08.68	1:40:05.85	1:48:12.37	1:56:27.74	2:04:28.84	2:12:33.95	2:20:17.72			
1:12:58.67	1:22:13.40	1:30:25	1:38:35.03	1:47:15.92	1:55:26.62	2:03:30.34	2:13:53.24					
1:26:46.42	1:36:05.52	1:45:19.77										
1:13:33.29	1:22:09.60	1:30:40.95	1:39:10.19									
1:16:15.15	1:26:00.35	1:35:42.05										



RALPH DE PALMA IN FIAT AND EDDIE HEARNE IN BENZ, FREE-FOR-ALL STARS

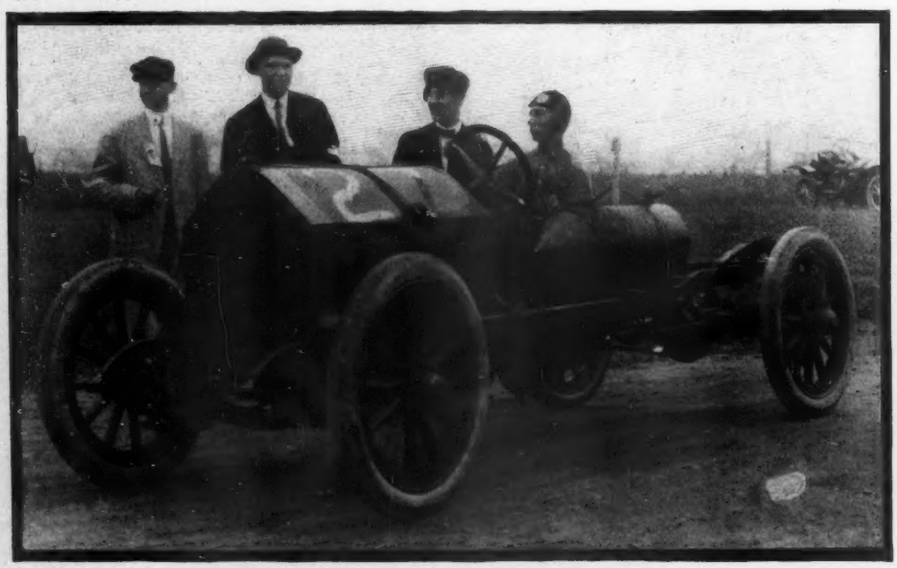
In event No. 7, a free-for-all open race of 10 miles, there were six starters. This event went to de Palma in his 200-horsepower Fiat. De Palma got away in the lead in this event and at the end of the first lap was almost a hundred yards ahead of his greatest rival, Hearne in the Benz, and although he maintained the leading position till the finish of the race, the end of each lap showed Hearne about 25 yards closer to him, and at the finish of the race, which was most exciting, Hearne was less than a car length behind. Third position in this event went to Merz, in a National. Of the ten events on the program this afternoon the rest were for 5-mile distances, and each was confined to a different class of cars.

BANKS HELP THE BUICK

Chicago, Sept. 3—According to telegraphic advices from New York the financial affairs of the Buick Motor Co. have been straightened out there by its bank and merchandise creditors, and it is believed a great deal of the tension existing in the industry has been relieved. The dispatch claims the company owed to banks about $2,700,000. Its indebtedness to merchandise creditors was between $4,000,000 and $5,000,000. Rather than have the credit of the industry in general disturbed, the banks agreed to an extension of the Buick company's loans for 1 year.

There was also advanced $2,500,000 new money to take care of the more pressing claims. For the fresh loan the banks were secured by collateral consisting of the stock in two of the General Motor Co.'s concerns.

An inventory of the Buick company's assets showed $11,000,000. Of this amount $4,000,000 was in materials. The company has on hand 3,000 cars. It was a case of over-expansion. The business was so good that the management undertook to manufacture about 40,000 cars a year, whereas under the new regime the output probably will be reduced to between 12,000 and 15,000 cars.



KNIGHT IN WESTCOTT, SECOND IN 100-MILE FREE-FOR-ALL ON SATURDAY

A general committee of creditors was appointed, of which Ralph Van Vechten, vice-president of the Continental and Commercial National Bank of Chicago, is chairman. There will be a reorganization of the management, it is said, and enthusiasm will be held in check until the debts are paid. It is thought that within 12 months the company will be able to clean up most of its liabilities.

RICH PRIZES AT ATLANTA

Atlanta, Ga., Sept. 5—In an effort to round up a collection of cars which will set a new line of records from 10 miles to 250 the Atlanta Automobile Association has offered $5,000 for one free-for-all race at its fall meet November 3-5. This affair will be called the Atlanta speedway grand prize and should prove an entertaining contest. Other features of Atlanta's fall meet will be the Coca-Cola cup and the Atlanta speedway trophy, in both of which there is a rich purse in addition to a fine cup. There will be eight races on November 3, consisting of mile record trials, three stock chassis events at short distances, two free-for-alls, and the 100-mile 301-450 class race for the Coca Cola trophy. On November 4 about the same card will be repeated, with the feature the City of Atlanta trophy race at 200 miles for 451-600 class cars. On November 5 there will be an Australian pursuit race, a 20-mile amateur free-for-all and a 250-mile free-for-all, the Atlanta speedway grand prize race, with the prizes in cash ranging as follows: First, $3,000; second, $1,000; third, $500; fourth, $250; fifth, $150; sixth, $100.

FORD CUTS A MELON

Detroit, Mich., Sept. 5—The Ford Motor Co. of Canada cut a melon when it celebrated its sixth anniversary by declaring a cash dividend of 100 per cent, amounting to about $100,000. Henry Ford, with 330 shares, receives the biggest slice, $33,000. He is president of the company. James Couzens.

vice-president, gets $6,600. There are about fifty stockholders, the majority of them being Canadians. The controlling interest, however, is held by Ford and Couzens and one or two others. The company sold its entire output of 1,200 cars for 1910. A $50,000 addition to the plant in Walkerville, now in course of erection, will materially increase the company's facilities. Sales are by no means limited to Canada. About 10 per cent of the output goes to Australia and cars were shipped during the past year to England, New Zealand, India, South Africa, and, in fact, to all the British provinces.

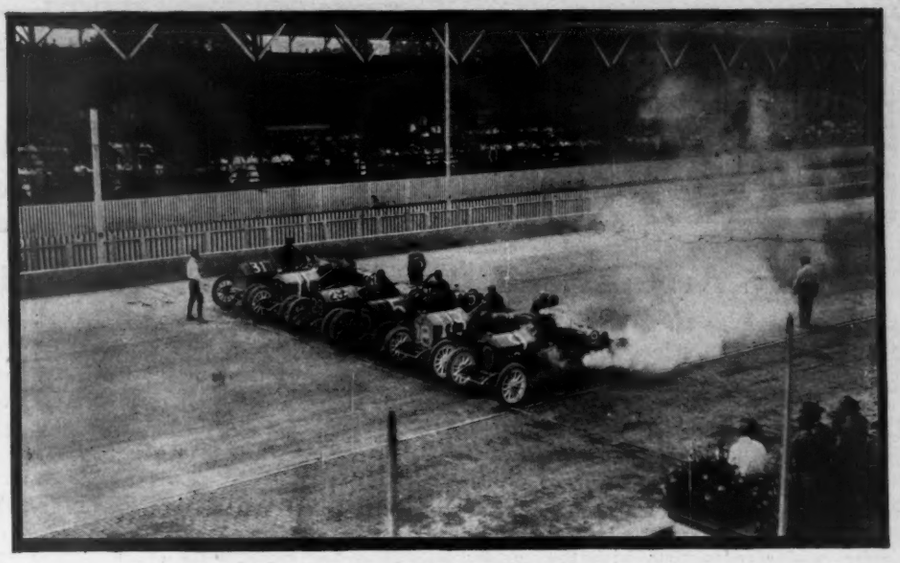
Directors of the Packard Motor Car Co. have declared the regular quarterly dividend of 1¾ per cent on the preferred stock. Checks will be mailed to stockholders September 15.

ANOTHER MAINE ROAD

Augusta, Me., Sept. 3—Plans are under way for a state road across the game region in Maine from Jackman to Kineo, a distance of 30 miles. At present there is no way of going direct to Kineo by motor car, and this is one of the most beautiful sections of the state that is visited yearly by thousands. Many more would go there if they could motor through. The nearest point a motorist can go to Kineo is to Greenville, at the lower end of Moosehead lake, and then Kineo is 20 miles away. Those who are planning to get the state to build the road say that it will also serve as a fire line to protect the forests as well as opening up new territory to motorists. It is estimated that the highway could be built for something like $50,000 or $60,000, and in one season the state would get that amount back from the increased number of motorists who would cross over from New Hampshire and include Maine in a summer trip instead of cutting it out as many do now. This would be particularly true, too, as Maine places no restrictions on visiting motorists. In the fall hundreds of sportsmen who visit Maine to shoot would go there in motor cars and carry along their friends if they could get to the start of the game region in machines.

TEXAS DEMANDING ROADS

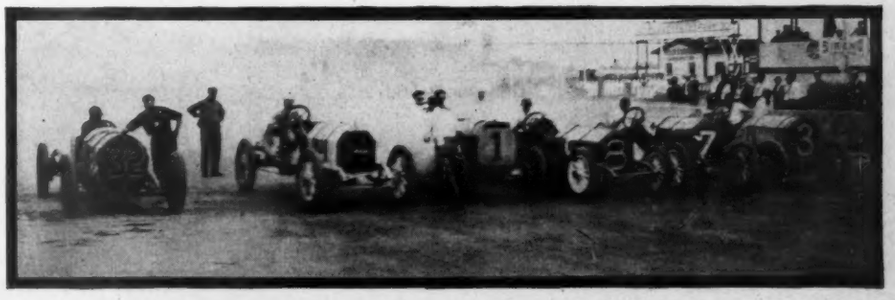
Austin, Texas, Sept. 5—The good roads' movement is receiving much attention in different parts of Texas. While the chief promoters of these proposed improvements are the commercial organizations of the different towns and cities, the propositions are receiving the endorsement and hearty support and co-operation of the farmers and people generally. The splendid example in the matter of good highways that is set by several of the counties, where from $200,000 to $1,000,000 have been spent in the construction of roads during the last few years is having a beneficial effect in creating an interest in and demand for improved highways in other counties of the state. Many of the counties are now considering the proposition of issuing bonds in amounts ranging from $100,000 to $1,000,000 for each county for the construction of modern highways. The general use of the motor cars is one great cause for the present general demand for good roads in Texas. It is a conveyance that is used all through the year for pleasure and business. Its practicability is recognized by the farming element. In addition to the motor highway that is under construction between New Orleans and San Antonio, about 600 miles, plans are on foot to construct several shorter motor roads in Texas. One of these is to run between San Antonio and Corpus Christi, 150 miles.



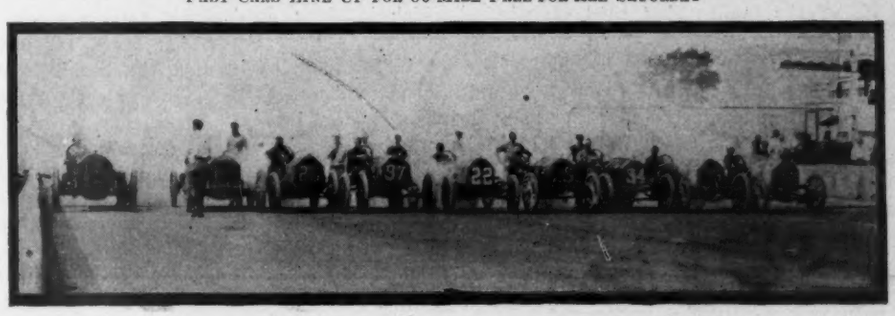
START OF EVENT NO. 5 ON SATURDAY, WON BY AITKEN IN NATIONAL

MORE WORK FOR THE PLUGGER

Detroit, Mich., Sept. 5—The Regal Plugger is soon to make another tour. This time the car will travel through the southeast. Under the direct management of the Southern Regal Auto Co., Atlanta, Ga., the car will make a 5,000-mile trip. The route laid out extends through the states of Virginia, North Carolina South Carolina, Georgia, Florida, Alabama, western Tennessee, Mississippi, Arkansas and Louisiana. Part of the proposed route is as follows: Leaving Norfolk, Va., a westerly course will be taken to Petersburg, thence north through Richmond to Fredericksburg, then west to Staunton, southwest to Lynchburg, then south to Greensboro, N. C. Going east from Greensboro, Raleigh will be visited. Then angling south and west the route goes into South Carolina, passing through Charlotte, Spartanburg and Greenwood on the way. Augusta, Ga., is the next large city visited. The route then lies through Macon, northwest to Atlanta and Chattanooga, Tenn., and then southwest into Alabama and north again into Tennessee. At Nashville a diagonal cut southwest will be taken, through Tennessee to Memphis and across the Mississippi into Arkansas. Just the edge of Texas is to be reached, where Texarkana will be visited. From there a southwesterly course will be taken entirely across the state of Louisiana.



FAST CARS LINE UP FOR 50-MILE FREE-FOR-ALL SATURDAY



FIELD AT THE TAPE ON SATURDAY FOR THE HANDICAP

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The Art of Road Building

IT WILL require the undivided energies and enthusiasm of all the motor car builders in the country, of all persons engaged in selling cars, of all persons engaging in vocations directly allied with the car and of all owners of cars to bring about the good roads movement as it is needed in this country at the present time. Since the inception of the car the public has been concerned in the development of the car which has been one of the grandest developments of the century, but this public must now become an active factor and make conditions more conducive to tour with the car by improving the roads. If the American roads were as good as the European roads the present cars would endure twice as long, the gasoline consumption would be reduced nearly 20 per cent and the tire wear would be almost cut in half. It would be an economic advantage if the present owners of cars and those interested in their manufacture, sale and repair would band together and build roads. This may appear philanthropic, nevertheless it is a fact.

IN MANY sections of the country roads are being built, but unfortunately they are the wrong kind of roads. The motor car is the approved and popular means of travel today and the roads that are being built should be constructed to meet the requirements of the motor car. It is foolish today to build roads entirely intended for horse traffic when the majority of the traffic is motor and which traffic in a few years will be more largely motor that it is today. The road commissioners throughout the country must learn this. It is their duty to acknowledge whatever is the predominating traffic and build to meet its requirements. The fact that macadam has been the acknowledged acme of road construction for generations is no reason that it should continue in such position. Macadam has proven an ideal road for horse traffic, but is almost useless for motor traffic because of its short life.

A COMMON remedy for the preservation of the road surface today is the use of tar or oil. Tar is being very generally used in Europe, but oil is receiving the major attention in America. No matter which is used the result aimed at is the same, namely, the preservation of the road surface. Both of these constituents play the additional role of laying the dust. Where there is dust it means the dust is but small particles of road which have been torn loose from the road body and every time there is the dust cloud so much road surface is destroyed, the road is made so much rougher and its end is so much nearer. Dust must be avoided if roads are to be preserved so that any process which prevents dust adds to the life of the road. That road commission which builds a good macadam or stone road and makes no provision to keep the dust from rising has done but half of its job in the road building field. It is one-half useless to build a good road and then not take commensurate plans to keep it in condition. In several states in the union this evil has been noted a dozen times during the last couple of seasons. When motor cars quickly tear up a new road the car is blamed, whereas one-half the blame should be placed on the road commissioners. It is foolish to dress a 7-year-old husky boy up in silks and then complain about the cost of clothing; and it is equally so to build beautiful stone roads and not oil, tar or add some other equally efficient dust preventative.

The Indianapolis Speedway

THE Indianapolis speedway completed a successful racing season on Labor Day, when it brought to a close the third meet of the season without a single loss of life having occurred during any of the three meets, a record commendable in contrast to that of a year ago. Undoubtedly the reason for the freedom from accidents was largely due to the drivers having become familiar with the track as well as to the fact that the present arrangements are so perfect as to make fatal accidents well-nigh impossible. The two leading merits of the speedway are its brick surface and its safety wall around the turns. The safety wall is a cement structure around the outside of the course at the turns and against which cars have frequently run when a steering knuckle or other part has broken. This wall has prevented several, what might have proven, fatal accidents during the season just closed. The brick surface, which was condemned so generally at first, because of its being designated the graveyard of tires, has rather established a most favorable reputation for itself, it having a record of 200 miles at over 70 miles an hour without a single change of tires.

THE familiarizing of the drivers with the speedway has been a big factor in the freedom from bad accidents this year. Drivers are now becoming numerous among racing teams, who are familiar with handling cars at 60 miles per hour and there is a big crop growing who can handle machines safely when they are traveling at 75 or over 80 miles per hour. These drivers have learned the art of holding the car straight should a tire blow out on a straightaway or on a curve and they are also now experienced in the matter of careful handling of the car in exigencies that may arise.

ONE regret exists in connection with the two American speedways and that is that more manufacturers have not entered in the contests that have been staged on them. There is not a solitary manufacturer of cars in the country but could have learned a few good points about his car by competition in some of the events run off during the present season. Those makers who have competed are loud in their praises of what they have learned; some of them had plenty of room for improvement, but they have made good and a general benefit will result to the industry. All makers do not believe in racing and those who do not have some other way of discovering the shortcomings and merits of their machines. Some of the best makers in the land have made discoveries in design this year that will have far-reaching effects. The continuous speed possible on the speedway is its biggest factor in testing out cars. When machines can travel at over 70 miles per hour for 2 or 3 centuries that terrific speed is sure to bring out weaknesses in design. That speed for continued distances will determine whether or not the bushings in the connecting rods are capable of withstanding the terrible pounding that is imposed on them or not. It is easy for a bearing to stand the hammering in ordinary touring work, but entirely a different problem when called upon to withstand high-speed motor work for successive hours. Speed is the greatest tester of them all, and the speedway has taken the premier position in bringing this aspect of the sport to the fore. The American car industry is better this year because of the Indianapolis and Atlanta speedways, and the owners of these speedways are deserving of praise for their energy and enthusiasm in their work.

KNIGHT GRANTED HIS AMERICAN PATENTS

Government Issues Papers on the Slide-Valve Motor—Engineers on Standardization

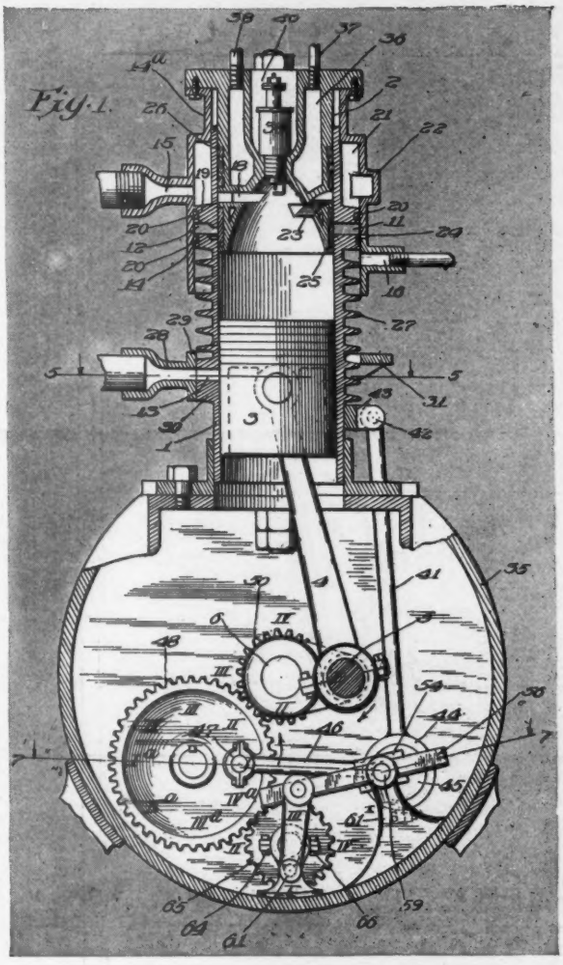
WASHINGTON, D. C., Sept. 5—Perhaps one of the most interesting patent issues which have been granted of late was one given August 23 to Charles Y. Knight, Oak Park, Ill., on his slide-valve motor. The patent bears the official number of 968,166. It is issued to Charles Y. Knight, with one-half assigned to Lyman Bernard Kilbourne, Chicago, who is Mr. Knight's partner in the firm of Knight & Kilbourne.

The issuance of this patent is of special interest in view of the fact that it is rumored three or four American concerns already have contracted with Knight & Kilbourne for the rights to manufacture sliding-valve motors of this type in this country under the Knight patents. Additional interest also is added because of the fact that other manufacturing concerns in America have within the last year stated that they hold prior patents which would nullify the Knight patents. The issuance of these patents has been delayed from time to time, application for them having been filed over 6 years ago, namely, April 4, 1904. The patent as issued is particularly comprehensive, Mr. Knight being allowed in all twenty-eight claims, the twenty-eighth being as follows:

"In an internal combustion engine the combination of a fixed cylinder having intake and exhaust port, a cylindrical head projecting into said cylinder and spaced from the walls thereof and forming an annular space therewith, two concentric cylindrical elements telescoped with said cylinder over said head, around the combustion space of the engine, reciprocally in said annular space, the inner one of said elements having ports adapted to communicate with the said intake and exhaust ports and engaging the exterior of said head for controlling said ports therein and the outer one of said elements engaging the interior face of the fixed cylinder for controlling the said ports therein, a working piston reciprocating axillary with relation to said elements and surrounded by the inner one thereof, speed reducing means positively connecting the piston with said elements for reciprocating them with relation to the said head and fixed cylinder, and means for firing a charge in the explosion space."

This claim is particularly exhaustive and covers the Knight design in which are two reciprocating sleeves between the piston and cylinder walls. This also covers the use of ports in the reciprocating sleeves for controlling the entrance of mixture and exit and exhaust gases. This claim further covers the positive interoperation of the two reciprocating sleeves with respect to the reciprocating piston.

The illustration showing a section of the motor is particularly crude, and incorporates but one reciprocating sleeve, which is the cylinder wall and is marked 1. It is shown in the form of an open-ended barrel and 14 is the fixed cylinder, and 2 is the third cylindrical element which is fixed against movement with the piston



THE KNIGHT SLIDE-VALVE MOTOR

by being rigidly secured to the cylindrical part 14. The outer cylinder 14 corresponds with what is the usual fixed cylinder in an ordinary gasoline engine, but for the sake of exposing the sides of the inner cylinder Fig. 1 for the cooling action of the atmosphere, the outer cylinder is cut away at its lower end and supported by a series of standards or bolts not shown in the illustration.

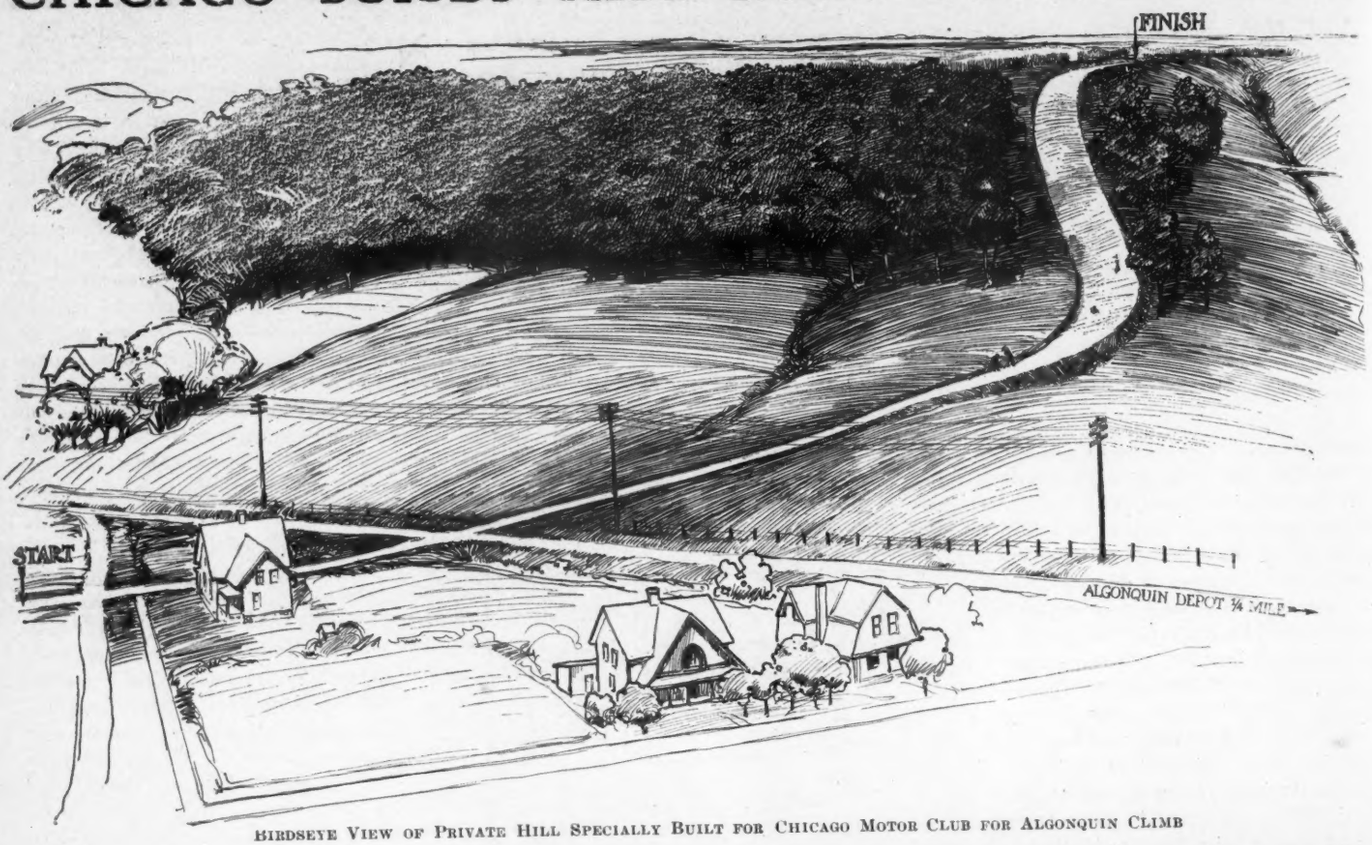
Mr. Knight now is in England, in which country he has resided for several years following the introduction of his idea in Europe. The largest foreign user of the Knight engine is the Daimler company.

NEW YORK, Sept. 3—The newly appointed standardization committee of the Society of Automobile Engineers has much to do and it is the intention of the body to begin this work at once. The committee will be enlarged as it is found necessary and various sub-committees will be actively engaged throughout the country on component parts of motor cars which can be properly standardized at this time. This includes raw materials, machine tools, semi-finished and finished parts, engineering methods and practices. Proper standardization will mean a tremendous saving to the industry and the public because it spells efficiency and quality and reduces cost and facilitates production; it also means interchangeability.

The committee now has in hand the following subjects. Specification and heat treatment of motor car materials; the indexing and digesting of motor car engineering literature; the compilation and publishing of an engineers' hand book, seamless steel tubing, sheet metal, lock washers, limits for screws and taps, round-cornered square holes and keyways, brake and clutch lever forgings, practice in plain and anti-friction bearings, wood wheel dimensions and fastenings for solid tires, shackle bolts, carburetor flanges, outlets, bolt-hole center distances, cap screws, gasoline connections, throttle levers and holes in same, water connections and gaskets; motor car nomenclature and frame sections. The matter of sheet metal alone involves the consideration of the chemical composition, dimensions and standard of measurement of clutch disks, brake drums, body panels, mufflers, radiators, fenders, hoods, sod pans, fan blades, hub caps, dashes, steps, running boards, miscellaneous stampings and many other parts.

On the committee are the following: Howard E. Coffin, president of the society, ex-officio; Henry Souther, Hartford, Conn.; James H. Foster, Cleveland, O.; H. S. White, Detroit, Mich.; Charles T. Jeffery, Kenosha, Wis.; Elwood Haynes, Kokomo, Ind.; H. W. Alden, Detroit, Mich.; Arthur Holmes, Syracuse, N. Y.; W. H. Van Dervoort, East Moline, Ill.; D. F. Graham, Bristol, Conn.; G. E. Merryweather, Cleveland, O.; A. C. Bergman, New York; Coker F. Clarkson, secretary, 1451 Broadway, N. Y. All of these men are regarded as authorities in their respective lines and are enthusiasts on the subject of standardization. They will set about their task with a will, and it is believed much good will result from their researches in the direction of standardization.

CHICAGO BUILDS HILL ROAD FOR CONTESTS



BIRDSEYE VIEW OF PRIVATE HILL SPECIALLY BUILT FOR CHICAGO MOTOR CLUB FOR ALGONQUIN CLIMB

CHICAGO, Sept. 7—The only hill ever constructed especially for a motor car climbing contest in this country and maybe the world will be given its first public trial a week from Friday, September 16, when the fifth annual hill-climb of the Chicago Motor Club will be held at Algonquin, Ill., 50 miles from Chicago, and which is regarded as of national importance. The hill has been named Algonquin in honor of the town, which has built the hill road for the Chicago Motor Club and which has just completed it. In the past Worcester, Mass., and Minneapolis, Minn., have talked of building hills for contest purposes, but it has remained for the Chicago Motor Club to be first to turn the trick.

The Algonquin hill will be only part of the day's show, for the Chicago club is the originator of the double climb, one in the morning from a standing start and the other from a flying start in the afternoon. In the past Perry hill has been used for the standing start, but Perry has been thrown into the discard because of the annual row with Dundee county, which is far from being friendly to the motorists. That's the reason for the building of the new road, which has just been completed. The new slope is so much steeper than anticipated that it has brought about a revision of the program and the flying start climb will take place on Algonquin hill and the standing start on Phillips hill.

No one will make Algonquin hill on high—that's clearly evident now. It is a grade that will require the use of the intermediate gear and no very fast time will be made, even with a flying start. It is about ½ mile in length and has a total elevation of 214.3 feet, with the average grade 12 per cent. There are two turns on the road and both are heavily banked. Up to the first tunn the road is not so very steep, but between the first bend and the second one it probably is about 20 per cent. Both this hill and Phillips will be well oiled for the contests, the club having arranged to use 5,000 gallons of oil to keep down the dust. The Algonquin hill has a gravel road and is about 20 feet in width. The new hill is located just south of the railroad that runs through Algonquin and is only ¼ mile from the depot.

STARTING POINT OF ALGONQUIN HILL IS AT FAR END OF STREET

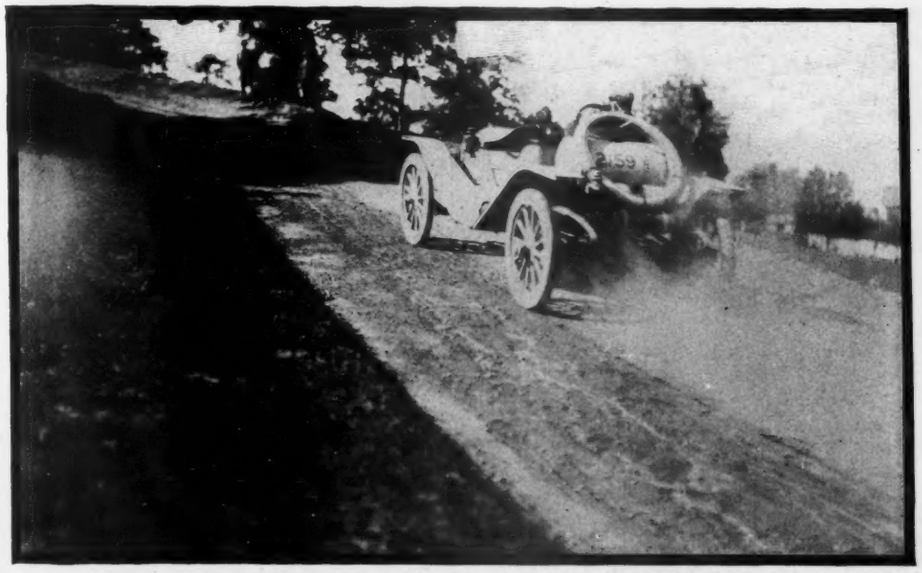
TEXAS COUNTS ITS CARS

Austin, Texas, Sept. 3—Statistics showing the number and cost of motor cars in Texas have just been gathered and compiled by the Texas Commercial Secretaries' Association. Reports which are said to be practically complete were received from each county. They show that there is a total of

approximately 30,000 cars in the state and that their average cost is $1,500 each, or a total of $45,000,000. It is estimated that new cars are being bought at the rate of $15,000,000 per annum by the people of Texas. The reports show that there is a steady increase in the number of machines in almost every county of the state and that the number in use has been doubled during the last 2 years. The average life of a motor car in Texas, where it is put to continued use throughout the year, is placed at 3 years. This is considered an unusually short period of usefulness for a car, but it is explained that perhaps more service is gotten out of them in Texas than any state in the union. This is particularly true of the plains country in the western part of the state and in the panhandle region where thousands of cars are used by ranchmen and business men. There is a great lack of railroads in that broad scope of territory and the motor car is used for private and public transportation between the different towns and communities that are situated far apart.

The reports to the Texas Commercial Secretaries' Association show that 11 per cent of the cars in this state are in transportation service of one kind or another. The remainder are used chiefly for pleasure. More than one-third of the 30,000 in Texas are owned by farmers and ranchmen.

No statistics have as yet been gathered as to the amount of mortgages outstanding upon these cars, but it is claimed that the sum is comparatively small. According to the statements of dealers their sales in Texas are largely for cash. It is admitted that the buyer sometimes raises the money to pay cash for a machine by mortgaging some other property that he may own, but this is by no means a general practice, it is stated. The banks seldom are called upon to advance money with which to buy a car.



STIFF GRADE AT FIRST TURN OF ALGONQUIN HILL

OHIO BEATS SPEED TRAPS

Columbus, O., Sept. 5—Ohio constables and justices no longer can reap a golden harvest from the pockets of motorists, for the speed trap in Ohio is doomed. In an opinion rendered by Attorney General U. G. Denman of Ohio to William Brown, Cleveland justice of the peace, it is held that a justice of the peace has not final jurisdiction in a prosecution for violation of the state motor law unless the accused either pleads guilty or waives the right to trial by jury. Attorneys and motorists believe that this ruling will put a check upon the methods adopted by country constables along the public roads. They regard the decision as revolutionary in motor legislation and one that is bound to mean less cash in the treasuries of many towns. The prevailing opinion seems to be, on the other hand, that the justices of the peace will try to test the ruling in the supreme court. Were the decision of the attorney general to hold, it is felt that many motorists caught for speeding would immediately plead not guilty and take the case to the higher court for trial. On the whole the opinion is looked upon as a decisive victory for the motorists over the small town constable and speed trap manipulators.

GENERAL VIEW OF LOWER TURN ON NEW ALGONQUIN HILL AT ALGONQUIN, ILL.

Star Tour Proves No Boulevard Run

COLORADO SPRINGS, Colo., Sept. 4—Wearied to a point of exhaustion after 5 days of racking travel in the Kansas City Star trophies tour—promised to be a boulevard tour but developing into the severest sort of a reliability—there is a day of rest at this point. Tomorrow morning the homeward grind will begin with twenty-six of the thirty-five competing cars still in the running. The tour's length is 1,585 miles. None of the official cars has dropped out of the tour as yet, although the Lexington pilot car is in a repair shop here, having a rear axle repaired. A. O. Brooke, the agent and driver, promises to have it in the same tiptop condition as it was before a collision with a mountain near Raton, N. M., Friday. The Pennsylvania is the pacemaker and the Columbia the official car. Brooke was rounding a corner on a steep narrow mountain boulevard when a team suddenly hove in sight. To have crashed into the wagon would have meant death to someone; to have swerved off to the open side of the road would have meant casualties, also, as there was a precipitate drop of 3,000 feet. So Brooke steered into a ledge of rock, smashing a fender all to pieces, battering in the engine pan and injuring the rear axle.

A Great Western is holding on tenaciously to a perfect score, every other car having been penalized and some wrecked so badly that they had to be withdrawn. It began to rain at the hour of departure from Kansas City, August 31, and rained until the tourists crossed the Colorado line. But even now with no moisture the conditions are frightful. Colorado has undergone an unusual late summer deluge of rain and the roads are not only cut to pieces but the humped wooden culverts over the irrigation ditches can hardly be crossed.

There are two trophies in the Kansas City Star trophies tour—one for the dealers' division, in which thirty-two cars were entered, and one for the private owners, with three starting contestants. All of the private owners had dropped out of the running before Trinidad had been reached except the Franklin of David E. Gudgell. It had been provided that the private owners' competition would end here at the springs in order that they might tour Colorado. So Mr. Gudgell, who is accompanied by his wife, will get the trophy. He won in last year's Star tour, also, in another Franklin. The winner of the $500 dealers' cup offered by the Star yearly last year was won by the Cadillac. There are no Cadillacs entered this year.

This is the score up to tonight—so far as observer's reports and time delinquencies are concerned:

No. 5—Great Western	Perfect
No. 30—Cartercar	999
No. 17—Buick—score held back	
No. 25—Haynes	998
No. 36—Ford	997
No. 15—Maxwell—no report for Friday	997
No. 37—Case	996
No. 12—Reo	994
No. 34—Falcar	993
No. 31—Cartercar—no report for Friday	988
No. 1—Franklin	987
No. 10—Kisselkar	986
No. 18—Buick	985
No. 20—Speedwell	963
No. 32—Mitchell	921
No. 19—Buick	913
No. 11—Velie	900
No. 16—Regal	864
No. 26—Inter-State	822
No. 3—Auburn	808
No. 8—Stevens-Duryea	695
No. 14—Maxwell	541
No. 40—Stoddard-Dayton	Minus 1882
No. 4—Abbott-Detroit—not in when official list was made up	
No. 6—Auburn—withdrawn	

PRIVATE OWNERS

No. 38—Franklin	911

Monday night the tourists will stop in Sharon Springs, Kas., after a 200-mile run; Tuesday night they will run on to Wilson, 207 miles; and Wednesday night the stop will be in Topeka, 77 miles from Kansas City and 187 from Wilson. The return to Kansas City will be at noon Thursday, when a great ovation is anticipated.

The longest day's run was from Dodge City to La Junta—220.7 miles. A remarkable reception was given the tourists in Trinidad, where every whistle in the town was blown for 30 minutes and practically every business house suspended operations. In the evening a Dutch lunch was served in an electrically lighted mine chamber a mile under Fisher's Peak, a mountain 10,000 feet high in the neighborhood of Trinidad. The tourists were taken to the spot in special trains over an exceedingly picturesque route.

ROUTE OF CATSKILL TOUR

New York, Sept. 5—Owing to the efforts of the Motor Contest Association, with the co-operation of the people of the Catskills and Robert Bruce, secretary of the American Automobile Association, the west-of-Hudson and Catskill scenic tour will be formally launched September 10 and 12, when the Catskill reliability contest route marked out from Edgewater, N. J., to the Catskills along the west bank of the Hudson, and return via Newburgh and Suffern to Edgewater, will become generally known through the fact that a large number of car owners and others will make the tour and thus formally dedicate it to the general purposes of the touring motorist. In brief, the tour will pass through Englewood from Edgewater, thence run to the pretty little village of Pearl River and on to Haverstraw, continuing along the new state boulevard on the banks of the beautiful Hudson. Then the climb will be over the Crow's Nest mountain to Cornwall, Newburgh, and then on through Kingston, New Palz, to Catskill village. Instead of going to Catskill village, however, the forthcoming endurance test will go direct to Haines Falls via New Palz and Palenville. This decision was arrived at owing to the fact that there will be a large number of women on the tour and the management thought it best to have the first day's run completed at the scene of the hill-climb, which will take place on Monday morning, an interval of 1 day, Sunday, coming between the first day's part of the contest and the climb. After the climbing is over, which will be early in the morning, the return trip will be made to Newburgh for lunch and from that point the run to New York will be continued.

Permission to pass through the restricted grounds at West Point was granted yesterday to the Motor Contest Association by the government.

HUB TAXICAB RATES RAISED

Boston, Mass., Sept. 5—The Boston taxicab companies have been granted an increase in rates, but not as fully as they petitioned the police commissioner for 2 weeks ago. Beginning September 20 the companies may charge 40 instead of 30 cents for the first ½ mile. The 10-cent limit for each ¼ mile thereafter remains the same. A rate of 50 cents for the first ½ mile was asked for. For each person in excess of one they may charge 20 cents each. The waiting time for which 10 cents was charged, 6 minutes, remains the same, the companies asking to have it reduced to 4 minutes.

BOOMING ROAD CONVENTION

New York, Sept. 5—At the third annual national good roads convention, to be held in St. Louis, September 28 to 30, there will be discussed the ways and means of providing the necessary funds for the general improvement of highways throughout the country. The consensus of opinion seems to be that in the construction of the main traveled highways, or trunk lines, the expense of such work should be borne in part by federal appropriations and state appropriations. Up to the present time no federal appropriations have been made for road construction, although a bureau is maintained which furnishes advice and tests road materials. This bureau is under the direction of Logan Waller Page, at Washington, D. C., and has been of the greatest value in stimulating interest in the good roads movement throughout the Union.

This third national good roads convention promises to be a notable gathering for the southwest, where the question of highway improvement is one of the live issues of the day. The committee includes officers of the National Grange, Farmers' Union, American Automobile Association, United States Office of Public Roads, American Road Builders' Association, National Association of Automobile Manufacturers, League of American Wheelmen, and motor and accessory manufacturers. St. Louis has made arrangements for the convention with a thorough and lavish hand, and besides the instruction available from the road experts there will be functions including local tours, a banquet and a steamboat ride. The Automobile Club of St. Louis, nearly a thousand strong, is in charge of the local arrangements, along with city, county and state officials.

Local dealers and manufacturers from other sections of the country are evincing

much satisfaction at the prospect of being able each year to make an early appeal to their clientele in this section of the country, and long before the gates of the New England fair were thrown open to the public Monday every available inch of space in the big show tent had been engaged. According to the committee of the Worcester Licensed Automobile Dealers' Association which has had charge of the show, next year the outdoor show will be just triple the size of the present one, and will equal in size that of the annual one held in Boston.

SYRACUSE SETS A DATE

Syracuse, N. Y., Sept. 3—The date of the Syracuse Herald sociability run has been definitely fixed for Saturday, September 24. It is the second annual run promoted by this paper. The route has been determined; Syracuse to Camillus, to Elbridge, to Auburn, Owasco, thence to west shore of Skaneateles lake, Skaneateles village, Marcellus, Camillus, Syracuse, in all 75 miles. The run is through a beautiful region and the start will be made at 1:30 p. m., and the run will be finished about 5 o'clock. The secret time allowance will be placed in the hands of Mayor Edward Schoeneck. The winner will receive the Herald solid silver trophy, valued at $100. The Automobile Club of Auburn has arranged to furnish the contestants with a substantial escort as they approach Auburn, and will accompany the Syracusens for most of the remainder of the trip.

MORGAN TRUCK DEAL

Worcester, Mass., Sept. 5—Control of the R. L. Morgan Co., making motor trucks, passed today to a group of New York capitalists headed by Clair Foster, water registrar of New York city and former managing director of the Standard Plunger Elevator Co. Ralph L. Morgan, founder of the business, will be vice-president of the concern and will have charge of the designing and engineering departments, and Henry E. Whitcomb, the present treasurer of the Morgan company, will continue in the same capacity, with Henry Mason Smith, of New York, as assistant. Henry Bennett Leary, of New York, will be the new secretary, and the board of management will include the following: Frederick A. Philips, Thomas H. Greenwood and Conrad N. Pitcher, all of New York, and John E. Bradley, R. L. Morgan and H. E. Whitcomb, of Worcester.

OVERLAND WINS MAIL TEST

Philadelphia, Pa., Sept. 3—The Overland was victorious in the United States mail motor car efficiency test, which started last Monday and took place during the week under the joint direction of the Philadelphia postoffice officials and the Quaker City Motor Club. Each day the cars made the first delivery of mail to Bustleton and Torresdale, nearby suburban points. The primary object of the test was to demonstrate that the mail could be carried more rapidly and reliably, as well as more economically, by this modern method, than by the old-time and antiquated system of horse and buggy delivery of mails.

Labor Day Meet At Brighton Beach

NEW YORK, Sept. 5—After a hard blow dealt by the weather man Saturday, the financial speed carnival staged at the Brighton Beach motordrome scored a big success on Labor day, when the postponed program from Saturday, as well as the regular program, was run off. It was a great success from the viewpoint of the promoter, but the sport was lop-sided and top-heavy, without the semblance of races.

Probably 6,000 persons paid $2 a head to sit in the grand stand, and fully as many more sweltered in the field, at a lesser sum per head. One of the 50-horsepower Simplex cars swept the boards, winning both hour races and both 10-mile dashes. The last of these was so far down on the program that all the contenders carded for the event were eliminated before post time and the Simplex enjoyed a walkover.

The first race was a struggle between two S. P. O. cars at 5 miles. No. 17 won as far as one could throw a stone. The next was a 10-mile dash from which scratches took all the interest. The next was the first of the hour races, in which the Knox broke a valve while leading in the thirty-ninth mile, leaving the Simplex out in front. The Mercer defeated S. P. O. 17 at 10 miles, and the program wound up with two more Simplex triumphs. During tthe afternoon the Benz, No. 19, unofficially lowered the mile record for circular tracks to :49⅘.

By actual count, just thirteen cars participated in the races. According to the program, the winning Simplex car earned $1,200 out of the $1,300 offered in cash prizes. The Fiat took $50 of the remainder, and the final $50 did not have to be paid out. Summaries:

FIVE MILES, 300 CUBIC INCHES AND UNDER, CLASS E

Car	Driver	Time
S. P. O.,	M. P. Batts	5:16⅘
S. P. O.,	Jean Juhasz	.....

MILE TIME TRIALS

Car	Driver	First trial	Second
Simplex,	Robertson	:53⅘	:52⅘
Darracq,	Kerscher	:53⅘	:52⅘
Simplex,	Beardsley	1:00	
Black Crow,	Rost	1:15⅘	
Isotta,	Howard	1:00	:59⅘
Benz,	Oldfield	:50⅘	:50⅘

Benz, Oldfield, third trial, :49⅘.

TEN MILES, FOR 600 CUBIC INCHES AND UNDER, CLASS E

Simplex, Robertson	10:12⅘
Fiat, Kerscher	.....

ONE-HOUR RACE

	Miles
Simplex, Robertson	55⅘
Fiat, Kerscher	51
Isotta, Howard	48
Simplex, Beardsley	44
Black Crow, Rost	44
Knox, Oldfield	39
Allen-Kingston 1, Ormsby	25

TEN MILES, CLASS E, UNDER 300 CUBIC INCHES

Mercer, E. H. Sherwood	10:46⅘
S. P. O., M. P. Batts	.....

TEN MILES, UNDER 600 CUBIC INCHES, CLASS E

Simplex, Robertson (Walkover)	10:08⅘

ONE-HOUR RACE

	Miles
Simplex, Robertson	55
Allen-Kingston, Ormsby	48
Mercer, Sherwood	35
Isotta, Howard	No fin.

SHOW AT WORCESTER

Worcester, Mass., Sept. 7—The second annual outdoor show ever held in this section of the country and the east was opened in this city Monday under the auspices of the Worcester Licensed Automobile Dealers' Association at the Greendale fair grounds, in conjunction with the annual New England fair which opened on Monday also and closes Thursday. This year's show not only outclasses that of the association's first attempt, but the number of cars is the largest ever seen together in one place here. The association not only provided a fine display hall for the members and manufacturers who wished to exhibit their 1911 models, but also furnished a most comfortable reception room adjoining the big exhibition tent in a smaller tent where motorists could rest. The cars on exhibition, most of which were the 1911 models, were as follows: Buick, Oldsmobile, Stearns, Cadillac, Thomas-Flyer, Stanley steamer, White steamer, E-M-F, Studebaker, Chalmers, Lozier, Mercer, Franklin, Hudson, Elmore, Overland, Columbia, Garford truck, Maxwell, Stoddard-Dayton, Speedwell, Knox, Ford, Winton and Packard.

WORK OF CARS IN PHILADELPHIA MAIL EFFICIENCY TEST

Date	Car	Driver	Postoffice Station	Mileage	Start	Finish	Stops	Time
August 29....	Bergdoll	Vaughan	Torresdale	19.2	7:05	8:58	102	1:53
	Maxwell	Smith	Bustleton	18.2	7:30	9:37	79	a2:07
August 30....	Hudson	F. Yerger	Torresdale	19.2	7:08	8:49	102	1:41
	Oakland	McGee	Bustleton	18.2	7:25	9:29	79	2:04
August 31....	Overland	Greenwood	Torresdale	19.2	7:03	8:38	103	b1:35
	Klinekar	Morton	Bustleton	18.2	7:40	9:15	79	1:35
September 1—	Klinekar	Morton	Torresdale	19.2	2:11	4:03	102	1:52
	Pullman	Bilner	Bustleton	18.2	7:30	9:10	79	1:40
September 2..	Reo	I. Yerger	Torresdale	19.2	7:13	4:40	102	9:27
	Parry	McCullough	Bustleton		Failed to report for run			
September 3..	Mitchell	Bishop	Torresdale	19.2	7:16	8:54	102	c1:38
	Haynes	La Roche	Bustleton	18.2	7:48	9:26	79	1:38

a—Five minutes off, blocked at a railroad crossing
b—Two minutes off, extra stop in Bucks County, off route
3—Four minutes off, extra stop in Bucks County, off route
Overland car, actual time 1:33, declared the winner

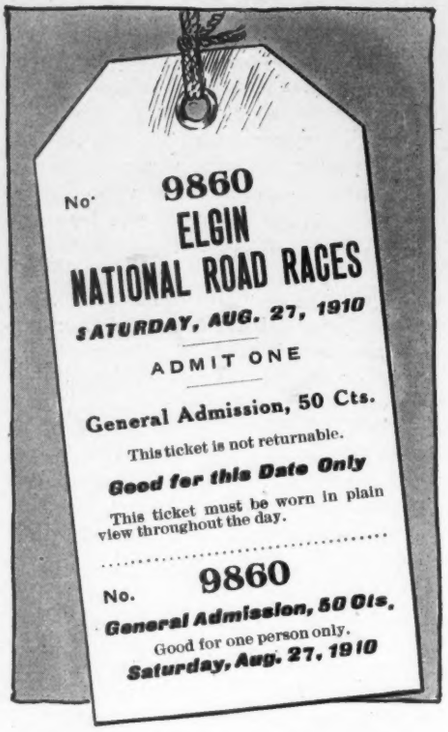
MODERN METHOD OF ROAD-RACE PROMOTION

System of Scoring Used

CHICAGO, Sept. 5—The aftermath of the national stock chassis road races at Elgin is a most pleasing one, contrary to the general run of things when it comes to this branch of the sport, especially from the financial angle. The Elgin Automobile Road Racing Association expects to show a balance on the right side of the ledger for its work of promoting the contests, while the coffers of the Chicago Motor Club, which conducted the events, have profited also. No protests were lodged and everyone is satisfied with the way the national races were handled and are looking ahead to next year when it is expected the races again will be run at Elgin by the Chicago Motor Club.

In counting the cost, both the Chicago Motor Club and the Elgin association are realizing what a vast amount of work is required to properly stage a road race and also they are surprised at the number of men required to give 100,000 people all the thrills attendant upon such a speed carnival. The spectators never realize what is going on behind the scenes. They see the course properly guarded, the cars lined up at the tape, the officials busy at their respective tasks and they enjoy a good day's sport, going home with never a thought of how it was done or how much it cost.

Now that it all is over, the promoters


No. 9860
ELGIN
NATIONAL ROAD RACES
SATURDAY, AUG. 27, 1910
ADMIT ONE
General Admission, 50 Cts.
This ticket is not returnable.
Good for this Date Only
This ticket must be worn in plain view throughout the day.
No. 9860
General Admission, 50 Cts.
Good for one person only.
Saturday, Aug. 27, 1910

General Admission Badge Everyone Wore

are beginning to cast about and count noses. This census is astonishing, for it shows that at least 850 men were engaged in the promotion and running of the races. It took 250 soldiers to guard the course and besides there were 150 deputy sheriffs, whose duty it was to assist whenever necessary and to aid farmers in collecting coupons. A force of eighty men sold tickets, while thirty more acted as ushers. It required sixty flagmen on motor cycles and to act as couriers, while seventy more sold programs. Forty officials were needed for the leading parts, while in addition to these there were forty scorers and seven checkers. The contest board of the Chicago Motor Club numbered fifteen, while there were seven

Chicago Motor Club Had Official Headquarters on Course

Warner's Electrical Timer Used

active workers from the Elgin association. It took at least ten cooks and waiters to handle the commissary department and in addition to all this the twenty-two car concerns, which were represented in the four events, brought about 120 men into action on the course.

In many respects the Elgin races were handled differently from similar events and there are those who say that many innovations of real worth were introduced. No other road race ever has been promoted co-operatively as were these and the idea which was carried out so successfully is declared to be the only one which will give the promoters a chance to make money or at least break even. When the races first were proposed by the Chicago Motor Club the outlook was dubious because of the financial loss of the Chicago Automobile Club at Crown Point last year. However, Chicago learned a lesson by the Indiana experience and profited thereby. It was realized that it was foolhardy to attempt to run a race unless all the ground adjacent to the course was under control of the race promoters; that is, if the box office was to make the right kind of returns. Then it was realized that the club should have the active assistance of the townspeople.

With these ideas for a working basis, the first step taken by the Chicago club was to interest Elgin, which was done, the result being the formation of the Elgin Automobile Road Racing Association, capitalized at $20,000 and the stock selling at $50 a share. Elgin, speaking from a theatrical viewpoint, was the opera house and the Chicago Motor Club was the theatrical company putting on the show. Elgin was to furnish the stage settings in the way of a course, grand stand, soldiers and the like, while it was up to the Chicago club to get the actors and run the show. Elgin at once got busy, sold its stock, secured the necessary prizes in the way of trophies and cash and secured the course and the soldiers, while Chicago got the entries.

Co-operation being the keynote, Elgin first interested the property owners around the course and secured the permission of all of them—eighty-five—to close the roads and use them for racing purposes.

The farmers were brought into the corporation by the agreement to split the profits if each farmer would see that no one stood on his property unless he carried the general admission ticket of the Elgin association. In return for this each farmer got 33 1-3 per cent of the gate on his property and being financially interested he was alert to see that there was no trespassing. Theoretically this brought everything under the control of the association and there could be no one looking on unless he paid for his fun.

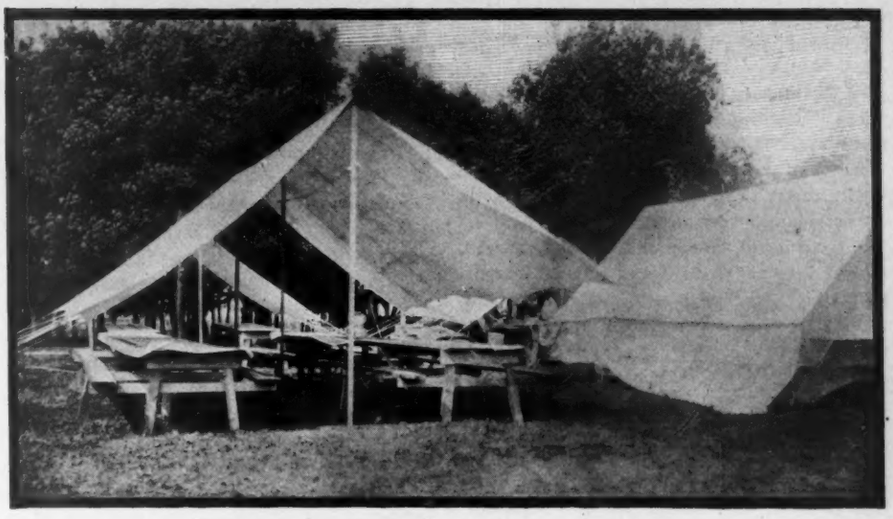
Then the interested parties decided that popular prices would interest the masses and bring out many thousands, whereas if Vanderbilt rates prevailed the westerners would not support the project. So it proved. It cost 50 cents first for a general admission, then the spectator paid 50 cents more for a bleacher seat, $1 for a grand stand seat and $1.50 for a box seat. Parking spaces were sold at $1 per car, so that it was possible for five people to see a day's racing at a cost of $3.50—certainly cheap sport.

With this as a basis for the promotion, the two organizations, set about the preliminaries. The Chicago Motor Club appointed a general executive to look after its interests at Elgin, the understanding being that all the work at the course, such as fixing the roads, building the stands and the like, should be under that official's direction and approval. In Chicago the club's contest board arranged the thousand and one details and scouted for entries. Both Chicago and Elgin did their work well. Elgin had the troops, stands and course ready as agreed, Chicago got the entries and officials, and the motoring world knows the rest. The races were the greatest success ever encountered in the west, if not the entire country.

Of course, there were a hundred and one other details worthy of note, but they all blended into one whole. The Elgin association established a camp at Elgin for the officials of the meet and for a week fed and lodged from fifty to 500 a day, which included the soldiers when they arrived at Elgin. The officials slept in tents and roughed it with great enjoyment, while palatable meals were served three times a day. So cleverly was this commissary scheme worked out, that each member of this small army fed at an expense of 55 cents per diem, and they were good meals, too. At other road races it is customary to allow the officials, working for glory, to shift for themselves, but Chicago believes differently and so acted. In addition to this, through the kindness of Farmer Hornbeek, official headquarters were established on the course, a fine two-story house being turned over to the Chicago Motor Club for this purpose by Mr. Hornbeek, who also allowed the grand stand to be erected on his property free of charge. The club maintained a secretary at headquarters for the week and in consequence the race details were carefully looked after. Hornbeek's was a popular place and it is a matter of record that he collected 16,000 coupons from the spectators for the 2 days.

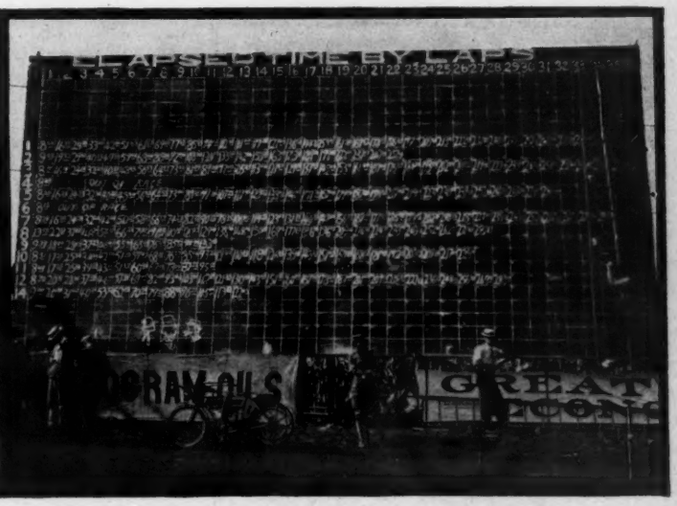
Great assistance was received from the motor cyclists, who came to the rescue when a call was sent out for flagmen, and the two-wheelers proved to be just the right men in the right place. The transportation problem was solved by them and the club did not have to worry over placing them. They were on the job at all times, were intelligent and active and to the Clan Excelsior the Chicago club owes a debt of gratitude. The motor cyclists also served as messengers and did good work. Also in this line came the ambulances and doctors, and it was through the courtesy of F. Klaner, a Chicago undertaker, and J. Cunningham & Son, body makers, that two motor ambulances were secured. Happily, there was little call for the ambulances, but they were there just the same. In transporting the troops a Kisselkar truck did fine work.

At the grand stand it seemed as if every detail had been attended to. The checking system worked to perfection and no complaint was heard of a missed lap. The club did not depend upon pencil and paper for this, but brought into use a system of cards. Each card had on it the number of the car being scored and also each different lap. Before the race started the cards were flat on a table, with a wire making a hinge. As the car passed each time a card was dropped, which



AN ARMY OF OFFICIALS WAS CARED FOR IN CAMP

ELGIN INTRODUCED REPAIR PITS MADE OF CEMENT



A HUGE SCORE BOARD KEPT THE PUBLIC INFORMED

showed the car's number and the number of that particular lap. The public was kept informed as to the progress of the race by means of a huge score board, while the timing was done by means of the Warner automatic timing device.

Across the road were the pits and here again the Chicago Motor Club scored in the originality contest. Instead of making the pits of wood as customary, Elgin looked into the future and put in cement pits which are permanent. Being almost flush with the ground, it is an easy matter to fill these pits with dirt, and next year when needed they can be cleared of the earth and again put into service.

Elgin has lost no time in looking ahead a year and already is talking about the 1911 stock chassis road races. It realizes that it will be a simple matter to make the course capable of a sustained speed of 70 miles an hour and this fall it will go to work to improve the circuit. The road will be widened and the heavy crown found in the home stretch will be cut down. The turns probably will be cemented.

An idea of the preliminary cost is furnished by Elgin, which spent something like $8,000 improving the course. It required another $3,000 to bring the soldiers here, while $900 more was spent for the deputy sheriffs. The grand stands and bleachers cost in the neighborhood of $3,000, but that was real economy. These stands were rented and were removed by their owner, who also put them up. If anything, these stands were too close to the ground, while the boxes should have been placed at the top, where their occupants could have had a better view of the sport. Elgin believes that another year it can save at least $10,000 as a result of the lesson learned this year. It thinks that it will be possible to get regulars to guard the course next year and that failing in this it can get a regiment nearer home than the Fifth, which came from down state. Most of the $3,000 spent for the troops was paid out for transporting them to and from Elgin.

MUNSEY CLASS WINNERS

Washington, D. C., Sept. 3—The fact seems to have been overlooked that a trophy was provided for each class of cars competing in the Munsey historic tour, together with a sweepstakes trophy for the car making the most perfect score in any division. In division 1A, for cars costing $800 and under, the class winner was No. 14 Brush, driven by D. E. McCoy, with 26 points; division 2A, $801-$1,200 cars, No. 34 Ford, J. Cherry driver, 7 points; division 3A, $1,201-$1,600, No. 25 Maxwell, H. E. Walls driver, 3 points; division 4A, $1,601-$2,000, No. 6 Washington, W. D. Arrison driver, 20 points; division 5A, $2,001-$3,000, No. 24 Stoddard-Dayton, L. H. Shaab driver, 12 points; division 6A, $3,001-$4,000, No. 33 Matheson, D. A. Hall driver, 122 points.

Gossip of Motor Trade in Detroit

DETROIT, MICH., Sept. 5—If there has been any weakening of public confidence in the future of the motor car industry, as some people have tried to make out, that feeling now has passed as far as the local situation is concerned, for present indications all point to a large output of 1911 cars and a continuation of the prosperity that has obtained in past seasons. Great activity prevails at all the local plants, the big Buick factory in Flint has resumed operations on a conservative basis, and, with several new car and parts factories nearing completion, plans are under way for still further extensions before snow flies.

The Bower Roller Bearing Co., maker of roller bearings for motor cars, railroad cars and all kinds of rolling stock, now located in Dayton, O., will begin work immediately on a large new factory at Goethe avenue and Hart street. The building will be 220 feet long, 90 feet in width in the widest portion, and of concrete construction, equipped throughout with steel window frames and sash. The directorate of the company includes many prominent business men of Detroit and Dayton. Detroit's increasing importance as the center of the motor industry explains why the company is moving here.

A group of buildings that will double its present capacity is being erected by the Kelsey Wheel Co., 1208-1250 Military avenue. The plant, when the additions now going up are completed, will represent an investment of $200,000, and still further improvements, to cost not less than $100,000, are contemplated. One of the new buildings, which is two stories high and 80 by 160 feet in dimensions, will be devoted exclusively to the manufacture of steel rims for motor car

FINAL REPORT OF THE TECHNICAL COMMITTEE ON MUN-

COLUMBIA NO. 2

	Points
Clamp on dash loose	2
Leak in gasoline pipe under tank at stop valve	1
Set screw in housing over camshaft on front left side loose	5
Small jet throttle levers loose at first point of rod	5
Leaky radiator	1
Two bolts missing connecting front cross member to right side frame	4
Loose bolt on lower right dash and one missing on left	3
Spread in front tread	5
	26

WASHINGTON NO. 5

	Points
Lost motion in square of bell crank on steering gear	5
Loose strut rod on back axle, two used	7
Loose bolt on mud pan, left side under seat	1
One broken blade on fan	1
Detached bracket supporting bonnet on dashboard	5
Front axle on right side out of line; rear axle spread	5
	24

WASHINGTON NO. 6

	Points
Lost motion in square of bell crank on steering gear	5
Grease cup missing at center of left brake drum	2
Lost motion post, ignition control mechanism	1
	8

FORD NO. 8

	Points
Two loose bolts in right and one in left, holding bonnet wood strips	3
Loose socket—base—on rear of triangle spout strut	25
Ignition rod strikes fan belt	1
	29

WARREN-DETROIT NO. 10

	Points
Broken flange on front cylinder of exhaust pipe	3
Dust cover loose over universal joint on propellershaft	1
	4

CORBIN NO. 11

	Points
Loose lock nut on strut tightener, on rear axle	1
Grease cup missing on left spring saddle, rear axle	2
Loose front spring clip on left side	2
	5

BRUSH NO. 13

	Points
Lock nut loose on front axle truss rod, right side	1
Loose set screw on jack shaft outboard bearing, right side, front and rear	2
One body holding down bolt loose on right side rear	1
Tickler off carbureter	1
Rear lamp loose bracket	2
Lamp bracket broken off, left side front	2
Nut holding down dashboard bracket, right side, loose on frame	1
Sag in both rear springs	15
Spread in rear tread	5
	30

BRUSH NO. 14

	Points
Cover on ball joint end of bell crank on steering gear loose	15
Exhaust outlet pipe from muffler missing	1
Rear spring sag	5
Spread in front tread	5
	26

PIERCE-RACINE NO. 16

	Points
Front axle bent backwards, left side	50
Two lower spring leaves moved sidewise	2
Eye or finger bolt front right side on mud pan missing	2
Square shaft in steering mechanism loose in socket	15
Truss under rear axle loose	15
Two bolts missing from right rear mudguard	6
And one from left mudguard	6
Loose aluminum bonnet bracket on dashboard	5
Spread in front tread	5
	106

ENGER NO. 17

	Points
Truss rod loose on rear axle	15
Step over forward shackle on right hand side loose on angle bracket and holding screws gone	4
Gasoline union on carbureter loose	1
	20

GREAT WESTERN NO. 18

	Points
All spring clips loose on rear springs	4
Through bolt of muffler lost	1
Stripped thread on grease cup on housing of pump gear	1
Magneto loose on base	4
One nut loose on manifold flange of exhaust cylinders No. 1 and No. 3	2
Trunnion pin loose, right side of clutch thrust collar	5
	17

Indications Point to a Big Season

wheels. Another building in the group will be used for plating rims and parts by a dip process, while a third will be utilized for the bending of wood rims. The group also includes a new administration building, 42 by 145 feet, and the offices will be magnificently finished in quartered white oak. The factory buildings are of mill construction, brick and re-inforced concrete being employed.

The Ayres Engine and Motor Co., a consolidation of the Ayres Engine Co., of Rochester, and the Gilmore Motor Co., of Detroit, has practically decided to erect a plant in Trenton, one of Detroit's down-river suburbs. Plans have already been prepared and the plant may be in operation before winter sets in. The company is capitalized at $100,000. It manufactures marine, farm and stationary engines and may add motor car engines to the list later on.

A building permit has been taken out by the Packard Motor Car Co. for a $10,000 power house, to be used in connection with its foundry and forge shops. It will be two stories high and of brick construction. The company is also putting in leading tracks at its No. 8 plant, on Bellevue avenue.

The Suburban Limited, which will be manufactured here by the DeSchaum Motor Car Co., made its appearance on the streets last week. It is a light car, of from 16 to 20 horsepower. All parts are of Hecla steel. The company is composed of ten Detroit business men, including W. Andrew DeSchaum, designer of the car. They expect to turn out 500 cars next year.

The dedication of the completed portion of the new plant the Warren Motor Car Co. is building on Holden avenue, last Thursday night, was a most enjoyable affair. Two orchestras furnished music for dancing. Supper was served in one of the big assembling rooms, which was prettily decorated for the occasion. Postmaster Homer Warren, president of the company, gave a brief talk, in which he thanked the employes for the hearty co-operation that had contributed largely to the company's success in the first year of its existence.

At the annual meeting of the stockholders of the Krit Motor Car Co., held last week, it was decided to add two more stories to the plant at the foot of Lieb street, increasing the capacity to 5,000 cars per year. Directors were elected as follows: W. L. Piggins, B. C. Laughlin, Kenneth Crittenden, William Van Sickle, L. C. Sherwood, J. W. Kanter and George G. Harris. The new officers are: President, W. L. Piggins; vice-president, Kenneth Crittenden; secretary and treasurer, B. C. Laughlin; manager of sales, J. E. Winney. The company will add to its line this year a surrey model for four passengers. The Krit Motor Sales Co. has been organized to handle cars of this make and will be located at 461 Woodward avenue, with Thomas C. Harris in charge. The sales room and garage at the address named are nearing completion, and it is announced that a complete repair shop also will be operated in connection. The formal opening of the new establishment will take place September 10.

The Oakland Sales Co. has been formed to handle Oakland cars at 742 and 744 Woodward avenue. J. A. Chene and A. L. Veckendorf, both of whom are well known in local trade circles, will be in charge of sales.

Reorganization of the Abbott Motor Car Co. was completed at the annual meeting last Wednesday, when the following officers were elected for the ensuing year: President, Charles W. Jamieson; vice-president, F. M. Knapp; second vice-president, H. M. Preston; secretary, Wade Millis; treasurer and general manager, M. J. Hammers. The board of directors was reduced to seven members and includes, besides the officers, W. S. Hoskins, of Pittsburg, and Chester M. Culver, of Detroit. Wade Millis, the new secretary, is a prominent Detroit attorney and is president of the Detroit Credit Men's Association. It is announced that, with the ample capital now available, the facilities of the plant will be materially increased and the operations greatly extended.

The name of the Bailey Motor Truck Co. has been changed to the Federal Motor Truck Co. M. L. Pulcher continues as general manager. The company makes a truck of medium capacity.

With a view, evidently, to still further extending its Flanders plant, the E-M-F Co. has practically closed a deal for the purchase of 2 acres of ground from the Beaubien Ice and Coal Co. at the northwest corner of West Jefferson avenue and Campau street, immediately adjoining the present factory. It is understood that the price agreed on is $29,000.

SEY TOUR PENALIZATIONS AFTER EXAMINATION OF CARS

OHIO NO. 21

	Points
Nut missing from front bolt on wood side piece under bonnet	1
Lost motion in square on belt crank steering mechanism	5
Rear lamp bracket missing	2
Union on gasoline pipe at tank leaking	1
Joint in muffler between body and head open at front end	3
Ignition advance gear disconnected near base of steering post	5
	17

CINO No. 22

	Points
Left front kerosene lamp broken off	2
Rear right spring sag	5
	7

STAVER-CHICAGO NO. 23

	Points
Two rivets pulled out of radiator stay flange	4
Bolt missing from mud pan at left rear	1
Loose rear right clip	1
	7

STODDARD-DAYTON NO. 24

	Points
Two loose bolts holding steering gear to frame	5
Dust cap over push rod guide of inlet valve mechanism front cylinder, loose	1
Brass nut on shaft socket bottom of gear, right side, loose	2
Radiator bolts	4
	12

MAXWELL NO. 25

	Points
Fan belt missing	1
Grease plug on reduction gear case differential housing missing	2
	3

CRAWFORD NO. 27

	Points
Front left bolt on mud pan broken	2
Outlet pipe from rear end of muffler missing	1
Rear bolt missing on right side of mud pan	2
Bolt missing from mud guard near rear end of front spring	2
Broken rear right fender	5
Spread in front tread	5
	17

INTER-STATE NO. 29

	Points
Right front mud guard bolt missing	2
Right fender mud guard brace loose in socket	1
Drain cock, on water pipe near bottom of radiator, leaking	5
Bolts lost from rear bonnet fastener on right-hand side	2
Locknut loose on link connecting clutch pedal to bell crank	1
Oil cup on bell crank of clutch loose	1
Locknut loose on brake rod, near clevice	1
	13

FORD NO. 30

	Points
Cap under ball joint at rear of front triangular strut, loose and one nut missing	20
Two nuts missing from wood bonnet piece, right side	2
Spread in front wheel tread	5
	27

KLINEKAR No. 31

	Points
Bolt through center of left front spring broken	1
Starting crank bracket loose on crank case	3
Front axle forced backward on left side	2
Locknut on outside brake band loose	1
Set screw on rear side of brake band broken off	1
Rear right spring saddle cracked	15
Rear spring clip shifted	1
Three wood screws missing from steering post bracket on dashboard	3
Right front holding down bolt on engine-leg loose	1
Left rear clip loose	1
	29

MOON NO. 32

	Points
Front right bearing loose in wheel	50
Distance rod loose in jaw	50
Six leaves in left front spring broken	30
Right spring clip loose	2
Fender bolts broken on right rear	2
Rear axle strut rod bent on left side	5
Three cap screws loose holding transmission case to differential case	3
Muffler, cut-out mechanism not in order	1
Spread in front wheel tread	25
	168

MATHESON NO. 33

	Points
Front axle bent back on left side	5
Spring clips displaced on left side	2
One bolt missing in mudguard bracket over front end of rear right spring	2
Three bolts missing in mudguard bracket on left side	6
Loose bracket supporting external brake band, right side	5
	20

FORD NO. 34

	Points
Exhaust pipe loose	2
Spring on brake lever trigger broken	5
	7

The Readers'

EDITOR'S NOTE—In this department Motor Age answers free of charge questions regarding motor problems, and invites the discussion of pertinent subjects. Correspondence is solicited from subscribers and others. All communications must be properly signed, and should the writer not wish his name to appear, he may use any nom de plume desired.

CARRYING STATE TAGS

PARKERSBURG, W. Va.—Editor Motor Age—We are planning to make a trip through several states soon and would appreciate it if Motor Age will advise as to tthe regulations regarding a motor car license for machines touring hrough Ohio, Pennsylvania, Maryland, New York, New Jersey, Delaware, Kentucky, Virginia, Indiana, Missouri, etc., or will itt be necessary to take up with the secretary of each state regarding same—J. M. Crawford.

Non-residents are only required to have their own state license while touring in Illinois, Ohio, New York, Indiana and Missouri, the last named being exempt for 20 days. Through New Jersey a special license must be taken out, which is good for 8 days; tourists through Maryland are exempt for 7 days under a special permit; through Delaware tourists are exempt based upon reciprocity, while Pennsylvania allows 10 days; those touring through Virginia must pay the state registration fee of $2 the same as residents, and the Kentucky tourists are exempt as long as they have complied with the laws of the state from which they come.

BOTHERED BY A KNOCK

Elmhurst, Ill.—Editor Motor Age—I would appreciate some help from Motor Age in locating trouble in my model T Ford. When I start my engine and it runs idle, there is a loud metallic knock or noise. This is most apparent after cranking the engine with the throttle open three or four notches. The knock again is plainly heard when the engine is running without a load, as when going down a slight incline. When the engne is pulling, like going up a hill, this noise is not heard, or else very faintly. I have had the connecting rods looked after twice, and still it persists. There is no knock when turning the engine fast by hand, showing the piston does not stick. The removable top plate, compression and valves are O. K. The last time the top cylinder head was removed there was a large mass of molten metal in the waterjacket near the front cylinder. This may have been there before. This knock was present when I purchased the car, and has become more noticeable since. It has been run 4,000 miles, and has lots of power. I would also like to know how to plug up a leak in the radiator. It is located in the lower right hand corner. Would it be possible to fill the leaking part with lead? If so, what preparatory treatment would be required? —Motorist.

Your trouble most probably is due to a loose bearing, perhaps one of the main ones of the motor; it might even be a connecting-rod bearing. There are many repairmen now on the job in various parts of the country who are not qualified for the position, and the fact that the rods have been looked after is no criterion that they are in first-class condition. Motor Age would suggest that you bring your car in to the Chicago branch of the Ford company as soon as convenient. Here, it is claimed, the cause of the knock will be found and eliminated; and if the fault lies in the construction of the car, no charge will be made for the repair. The Ford company is desirous that its product give the satisfactory service claimed for it, and the repairmen representing the company are skilled in the adjustment of all parts which are liable to give trouble to the uninitiated. A successful radiator repair is often a most difficult and arduous task, requiring the use of a soldering outfit manipulated by an experienced workman. It is difficult, without knowing the nature of the leak, to even suggest a temporary repair.

VANDERBILT CUP WINNERS

San Diego, Cal.—Editor Motor Age—Will Motor Age kindly state in the Readers' Clearing House, what cars and drivers have won the Vanderbilt cup races?—Lyle Carringer.

The first Vanderbilt cup race was run in 1904 at a distance of 284.4 miles and was won by Heath of France in a Darracq, who averaged 52.2 miles per hour. In 1905 Hemery of France won, averaging 61.4 miles an hour for 283 miles in his Darracq. The 1906 race went to Wagner of France in a Darracq, who averaged 60-8 miles an hour for 297.1 miles. There was no race in 1907 and in 1908 George Robertson of America won in a Locomobile, his average for the 258.6 miles being 64.3 miles per hour. Last year Grant of America, driving an Alco, won, doing 278.08 miles at an average pace of 62.8 miles per hour.

CARBONIZING OF CYLINDERS

Denver, Colo.—Editor Motor Age—Will Motor Age, through the Readers' Clearing House, answer the following questions:

1—Does a long-stroke motor carbonize quicker than a short stroke? If so, what is the cause?

2—Where could I secure some of the veary earliest numbers of Motor Age, and at what price?—Grant A. Wilson.

1—The accumulation of carbon in the cylinders of a motor is not affected by the length of the stroke. Excessive or quick accumulations of carbon generally are due to unsuitable or over-lubrication and overrich fuel mixtures, assisted by rough-cast cylinder heads.

2—There are a few early issues of Motor Age still in the files, which may be had at the regular price of 10 cents per copy.

LICENSE SHOULD BE GOOD

Bar Harbor, Me.—Editor Motor Age—Having been a subscriber of Motor Age for the past 2 or 3 years, and thus having been able to observe the complete information concerning all legislation concerning motor cars, I would beg to have the following points cleared up: During the spring of 1908, was granted a license for operating cars in France; my employer also was granted a car license at that time. These licenses were supposed to be good indefinitely. Has the International Automobile Congress caused these licenses to be nullified, or can I drive in France again this winter on the same licenses? Which of the many books advertised would be the best treatise on gasoline engines of the marine type?—J. Homer Nelson.

As long as you are in possession of a driving license which is permanent, there is no necessity of your applying for another. Perhaps the best books on marine gasoline motors are "Gas, Gasoline and Oil Engines," by Gardner D. Hiscox, published by the Norman W. Henley Publishing Co., New York, and "The Practical Gas Engineer," by E. W. Longnecker.

SPARK GAP TOO CLOSE

Reno, Nev.—Editor Motor Age—I notice in the Clearing House columns issue of August 11 a query signed "Puzzled" relative to a magneto missing at slow speeds. The continuous firing at low speeds precludes possibility of motor troubles, and in view of the fact that I had the same trouble some time ago and apparently solved it has led to my writing. My experience has been that where a motor fires correctly on battery, and also on magneto at higher speeds, but runs irregularly at slow speeds when motor is running idle, is due in nine cases out of ten to a too close adjustment of the spark gap of the plugs. I know a great deal of stress is laid on the decreased efficiency of the magneto at the lowest motor speeds in motor car works, but just a word on this subject. For the last 2 years I have been continuously employed in alternating on different runs, using the McKeen railway motor cars used on the Southern Pacific Railroad Co. These cars use a 240-horsepower, six-cylinder gasoline engine, the cylinders having a 10-inch bore and 12-inch stroke, and delivering their rating at 350 revolutions per minute. Two independent systems of ignition are used, the battery and Remy magneto. The motors are geared to 42 inches, and drive on high gear at very close ratio of 1 to 1, or, more correctly speaking, 26 to 30. When it is customary procedure to start the motor and run continuously on the magneto day in and day out for weeks, without recourse

Clearing House

EDITOR'S NOTE—To the Readers of the Clearing House columns: Motor Age insists on having bona fide signatures to all communications published in this department. It has been discovered that the proper signature has not been given on many communications, and Motor Age will not publish such communications, and will take steps to hunt down the offenders of this rule if it is violated.

to battery, it becomes very evident that low motor speed is something that is usually conjured up to explain other motor defects. A motor of this size, geared 1 to 1 to 42-inch wheels, and at 8 or 10 miles per hour on magneto without missing does not bespeak loss of magneto efficiency at slow motor speeds, and the motor speed at this gear ratio, wheel size and car speed is a low speed that is never approximated under any condition of motor car service, with their gear ratios and wheel speeds and comparatively higher speeded motors. —William P. Harlan.

ST. JOE, MO. TO 'FRISCO

St. Joseph, Mo.—Editor Motor Age—Please inform me through the Readers' Clearing House of the best route from St. Joseph to San Francisco.—Geo. M. D.

Leaving St. Joseph, go by way of Troy, Fanning, Highland, Hiawatha, Falls City, Shubert, Auburn, Dover, Nebraska City, Dunbar, Berlin, Avoca, Louisville, Springfield, Millard to Omaha; from Omaha go to Elkhorn, Fremont, Rogers, Schuyler, then Columbus. You might follow the recent Reo transcontinental route from Columbus, to Laramie, Green River, Ogden, Montello, Battle Mountain, Reno, Sacramento and San Francisco.

ADVANTAGES OF LARGE TIRES

Seattle, Wash.—Editor Motor Age—Will Motor Age kindly inform me through the Readers' Clearing House concerning the advantage of a large tire, merely from the point of view of the greater amount of air which it contains? That is, does the larger amount of air contained in it add anything to its easy-riding qualities aside from its other advantages? If it does not, would a tire 12 inches in circumference be as easy on the car as one, say, 42 inches in circumference, not taking into consideration the latter's many other advantages?

2—Also, does Motor Age think the axles and differentials of cars using solid rubber tires are seriously affected by their use? Are not the other portions of such a car affected so much sooner by the vibrations caused by solid tires as to make the effect on axles and differentials negligible?—Subscriber.

Aside from the advantage of a large wheel more easily riding over unequalities in the road surface, or assuming that with both diameter tires running on a perfectly smooth surface, the tires of one diameter would be equally easy riding as those of another providing the air pressures in both were equal. It has been proven that the use of solid tires does very much more seriously affect the life of steels employed in the construction of motor cars than that of pneumatic tires.

2—No. The springs of a car, when properly designed and adapted, greatly protectt he frame and the mechanism suspended from it, but tthe axles and their component parts have no such protection, so that tthey are most severely subjected tto the ill effects of vibration, and these effects are by no means a negligible quantity.

an offset crankshaft, is meant that the

WANTS SMALL SPARK PLUGS

Albany, N. Y.—Editor Motor Age—Will Motor Age, through the Readers' Clearing House, advise me where I could obtain spark plugs smaller than those in common use, for instance, ⅜ inch thick? I desire them for a very small motor, and those ordinarily used are too large. Is there any concern which carries them in stock, or will I have to have them made to order?—Reader.

Spark plugs of the size above mentioned will undoubtedly have to be made to order. It would not be practicable to carry such a size in stock. Perhaps the readers may know where plugs of this size may be obtained.

AUTOGENOUS WELDING METHODS

Vincennes, Ind.—Editor Motor Age—Will Motor Age through the Readers' Clearing House tell me where I can secure the methods, instruction and proper apparatus and tools to do autogenous welding?—Henry M. Williams.

Motor Age would refer you to Pondelick Brothers, Leavitt street, near Jackson boulevard, Chicago.

OFFSET CRANKSHAFT

Prophetstown, Ill.—Editor Motor Age—Please explain the meaning of offset crankshaft as employed in the Rambler, and in what way is it advantageous. Why should the piston not be at the highest point when it is on dead center? What, if any, difference is there between the offset crank and offset stroke?—Inquirer.

This question was both answered and illustrated in the June 30 issue of Motor Age, on page 20. By offset cylinders, or an offset crankshaft, is meant that the axes of the cylinders are not in the same vertical plain as that of the crankshaft. The difference between a motor with an offset crankshaft and one with the crankshaft centrally located is that if concentric lines were dropped from the centers of the cylinders of a motor with an offset crankshaft the lines would not pass through the center of the crankshaft, but would pass to one side of the center, an inch or ½-inch more or less and to the right or left as the case may be; and with a centrally located crankshaft, concentric lines dropped from the centers of the cylinders would pass directly through the center of the shaft. Some of the advantages claimed for the offset crankshaft are: Less liability of a back kick, reduced wear on the bearing surfaces of the cylinder walls, connecting rods and crankshaft, less liability of stalling the motor when the car is running slowly on a high gear, and other facilities entering into the design and construction.

HAS SEVERAL TROUBLES

New Canton, Ill.—Editor Motor Age—Will Motor Age kindly answer the following questions in the Readers' Clearing House?

1—I have a Chalmers 30 touring car and would like to know the gear ratio in first, second, third and reverse speeds.

2—I notice that after driving about 3 miles the water gets hot, not boiling but just steaming, the heat raising 10 or 12 feet above the car. I run with an advanced spark as far as possible. Should the motor get this hot?

3—The carbureter leaks at the little hole in the bottom of the air inlet whenever the car is brought to a stop. Could this cause the heating?

4—Would running with a closed exhaust cause the motor to get hot in this distance?

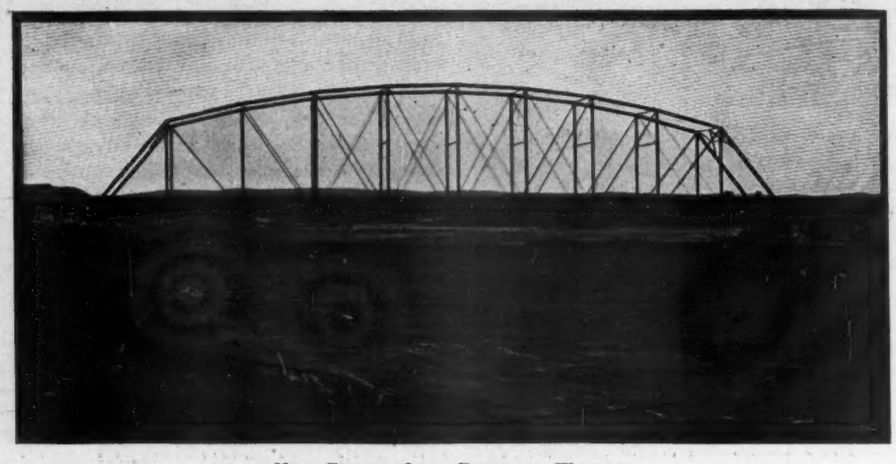
5—Should the water be so hot as to nearly burn the finger after going through the radiator? The water circulation and connections are all right, and the radiator is not clogged.—A Subscriber.

1—The standard gear ratio on the Chalmers 30 is 3¾ to 1 on the rear axle. This gives the ratio of motor to axle speed as follows: First speed, 12.72 to 1; second speed, 6.16 to 1; third or high speed, 3.78 to 1, and reverse 16.36 to 1.

2—This motor should not heat like this. There may be a score of reasons for it. See that your cylinders are free from carbon, that your valves seat properly, that the carbureter is properly adjusted and the lubricating system in working order; also be sure that the fan is on the job.

3—The fact that gasoline leaks from the carbureter shows that either the float level is too high and requires adjustment or that some dirt or something is preventing the needle-valve from seating properly. This alone should not cause overheating; an over-rich mixture is more likely the cause, and proper adjustment of the spraying-nozzle valve is the remedy in this case.

4—You should be able to run continually with the exhaust cut-out closed, but if the exhaust pipe were stopped up or the muffler clogged with soot or carbon, the power of the motor would be considerably reduced and over-heating quite possible from this cause, unless the exhaust cut-out were left open.



NEW BRIDGE OVER RIVER IN WYOMING

5—It is all right for the water to be hot so long as it does not boil. When it reaches the boiling point, though, something is wrong and the motor should be stopped lest the lubricant be burnt off the cylinder walls and the surfaces damaged by the moving pistons. A tight engine bearing or an impediment in the cooling system also might be the cause of the overheating.

FITTING REAR AXLE BEARING

South Braintree, Mass.—Editor Motor Age—Will Motor Age in the Readers' Clearing House column advise me how to improve my rear axle bearings on my old Wayne model A runabout? I do not want to go to the expense of buying an entire rear axle housing with bearings, etc. This car is equipped with what I presume to be Hyatt roller bearings, which are ½ inch in diameter and 5 inches long. I find by taking hold of the axle after removing the wheel that there is a lot of play between axle and bearings. I also find that the roller bearings do not fill up the cage that retains them in place by about ¼ inch. Now these bearings to my belief must have caused a considerable wear to the inner surface of the axle sleeve, as there is no provision made for a bushing where they must necessarily wear the sleeve. Can Motor Age suggest some bearings I could get and apply them to this type of car? What would cause the axle to wear in the hubs of the rear wheels when wheels are keyed on both with key and pin? With a brand-new cylinder, new rings and valves newly ground, why is it I get no compression whatever? The cylinder is cast in one piece and so has no gasket to leak.—Reader.

Motor Age would advise that you obtain from the Hyatt Roller Bearing Co., Detroit, Mich., a list of its standard sized bearings, and learn therefrom the size most adaptable to your rear axle, or since the axle sleeves are worn, they may be reamed or bored out a trifle and a size larger fitted. If this cannot be done without harmfully weakening the sleeve-portion of the axle, choose the size originally fitted, then have the sleeves rebushed. The bushing should be made from seamless steel tubing, but not until the new bearings have been obtained, so that there will be no error in machining up the bushings to a proper fit. Since your axle is designed for Hyatt bearings it would hardly be advisable to fit another type. Hyatt bearings are very extensively used in the rear axles of motor cars, and when of a proper size and fit are known to give very satisfactory service. The apparent wear of the axle ends inside the hubs of the wheels, where they are keyed to the axle-shafts, is due to elongation of the shafts and consequent compression or reduction of the diameter of the shafts in the hubs.

Most probably there is not sufficient space between the ends of the valve-stems and the valve-lifters when the valves are supposed to be closed, or the cam-shaft is not properly timed. One should be able to slide a business card between the ends of the valve-stems and lifters during the compression stroke of the piston. If there is a leak past the piston rings, it would be audible through one of the breather pipes of the crankcase; or if there are no breather openings in the crankcase, it might be advisable to open the case and listen while the motor is being turned over slowly. It is to be expected that with a new cylinder and new rings, the compression will not be very good until the motor has been run a while and the bearing surfaces worked in and polished. There should, however, be some compression.

INTERNAL TIRE CAPACITY

Washington, D. C.—Editor Motor Age—Will Motor Age kindly inform me the form or make of tire from which I might expect the greatest strength and service—clincher, quick detachable or Dunlop—the tires to be of the same size, of course, and used on quick detachable rims? Are the Dunlops made irregular size and consequently relatively larger than a corresponding size in clincher or quick detachable tire?—W. T. Gill.

It is true there may be a little more internal capacity within them than an ordinary clincher, but it would take a philosopher to get the extra amount. The additional internal capacity of a Dunlop is due to the air pressure forcing the tire out of the wires, the tendency of the tire being to jump the bead at this point because of the air pressure. Because of this there is the additional internal capacity.

HIGH-SPEED CLUTCH TROUBLE

Osage, Ia.—Editor Motor Age—Will Motor Age kindly explain through the Readers' Clearing House why the high-speed clutch on a model F Buick pulls out hard? It comes easy once it starts.—Buick.

If your gearset has been overhauled recently, the trouble is quite liable to be due to the fact that the pin in the square collar of the high-speed clutch-shaft was not properly dressed down, so that there is a binding of these parts when high-speed is thrown in, which makes its disengagement difficult. A rough or dry spot on the shaft might also cause similar trouble or a ridge brought about by excessive wear at the point where the collar comes to rest when the high-speed clutch is in engagement.

NOISE OF VALVE STEMS

Omaha, Neb.—Editor Motor Age—I am a regular reader of Motor Age and it has become necessary to seek some information. Will Motor Age advise me regarding the following:

1—While overhauling an Oakland 40 it was found that one of the valve stems had worn away the steel where it enters the cylinder head, thus greatly increasing the size of the hole. This has caused an annoying rattle. How can this be remedied? If left alone will it not grow worse?

2—What is the maximum speed of the National 40 touring car regularly equipped, including top, windshield and two extra tires?

3—What was the greatest speed attained by the National 40 at the Indianapolis speedway and what was the average speed?

4—What year did the Pierce-Arrow Motor Car Co. stop making four-cylinder cars?

5—Do not most engineers agree that the six-cylinder car is practical?—M. E. Peterson.

1—To eliminate the noise of the valve-stems in the enlarged guides, have the guides rebushed. This also will effect the operation of the motor and should bring about a noticeable improvement. Worn valve-stem guides on the intake side permit air to enter the cylinder on the suction stroke and this adulteration of the fuel mixture causes the motor to mis-fire when throttled down and running idle. They also have been known to permit the escape of exhaust gases past the exhaust valve-stems and produce an annoying hissing sound. To rebush the guides, have them bored out and a seamless steel bushing about 1/16 inch thick fitted into place. Methods of rebushing valve-stem guides are quite thoroughly covered in the repair-

shop columns of this issue. If neglected they will get worse, and more rapidly as the wear increases..

2—The maximum speed of the National 40, fully equipped, should be between 50 and 65 miles an hour.

3—The greatest speed attained by a National 40 at Indianapolis was an average of 82½ miles per hour for 10 miles. This was done by Wilcox at the May meeting in a 10-mile handicap event, the time for the 10 miles being 7:16.33.

4—The Pierce company stopped making four-cylinder cars in 1908.

5—Yes, most motor car engineers agree that the six-cylinder car is practical.

DISSOLVING LIME SEDIMENT

Concordia, Kans.—Editor Motor Age—Will Motor Age inform me what solution to use to dissolve the lime sediment that has accumulated in my radiator? The water is hard and sediment accumulates. —J. F. St. Clair.

Almost any of the boiler compounds on the market, which are obtainable from any of the engineer's supply houses, may be conveniently used for cleaning scale or deposits of lime from a radiator. If you prefer to make your own compound, dissolve 2 pounds of crystals of soda to each gallon of water contained in your cooling system. Put in the radiator, run the motor for a few seconds so that the solution is well distributed throughout the system, let it stand over night, then flush out thoroughly in the morning with clear water. When flushing out a radiator, see that there is an unobstructed flow of water through it. It often is beneficial to reverse the flow of water through the radiator in flushing it out, because there are often little scales of lime jammed in parts of the radiator which cannot be dislodged in one direction but which will loosen up very readily when the flow of the water is reversed.

THE CHATTANOOGA ROUTE

Kingman, Ind.—Editor Motor Age—Some of the readers of Motor Age in this town are contemplating a trip to Chattanooga, Tenn., this fall and wish to go by way of Evansville, Ind., Nashville, Tenn., and return via Lexington, Ky., Cincinnati, and Richmond, Ind. Can Motor Age give us a route, the character of the roads, what supplies should ordinarily be taken, and about how many days should it take to make the trip?—A. H. Lindley.

Leaving Kingman travel on to Rockville, Mecca, Ellsworth, Terre Haute, Sullivan, Paxton, Carlisle, Oaktown, Bruceville, Vincennes, Hazelton, Princeton and Evansville. Retrace the route back to Vincennes, then go to French Lick Springs, Paoli, Louisville, Thixton, Smithville, Balltown, Buffalo, Pikeview, Hardyville, Uno, Bear Wallow, Cave City, Bowling Green, Franklin, Mulloys, Millersville and Nashville. Returning to Louisville, take in St. Mathews, Simpsonville, Shelbyville, Peytona, Frankfort, Midway, Lexington, Donerail, Georgetown, Sadieville, Corinth, Williamstown, Dry Ridge, Walton, Florence, Covington, Cincinnati, Hamilton, Collinsville, Camden, Eaton, Riota, Campbellstown and Richmond. From Richmond take in Cambridge City, Lewisville, Knightstown, Greenfield, Cumberland, Indianapolis, Danville, Groveland, Bainbridge, Bellmore, Rockville and Kingman. The roads through Kentucky and Tennessee are very bad, and unless a motorist sticks to the so-called beaten path a great deal of trouble will ensue.

TWO CAUSES OF HEATING

Anaconda, Mont.—Editor Motor Age—I have taken a great deal of interest in the items on motor trouble. I notice Motor Age has failed to mention two of the most important reasons for motor overheating. One when the float is too high, and most repairmen try to cut down with the needle, which is impossible. The height of gasoline in the float chamber depends on the suction of the motor. Magnetos improperly adjusted will cause motors to overheat.—R. Gedye.

Motor Age does not agree entirely with Mr. Gedye when he states that the height of gasoline in the float chamber depends on the suction of the motor; and in all carbureters in which the quantity of gasoline that flows through the spraying nozzle when the motor is running, is governed by the needle-valve adjustment or the size of the opening in the nozzle, an excessively high float-level would have little if any effect upon the proportions of the fuel mixture except at very slow motor speeds. It would cause a constant flooding of the carbureter when the motor is standing idle, with the consequent loss of gasoline; and at slow motor speeds the overflow from the nozzle might be in excess of that required so that the mixture would become over-rich and overheating would result. In a properly designed carbureter the height of the gasoline in the float chamber of a motor is regulated entirely by the float and should remain constant regardless of the variable suction of the motor.

FOOT BRAKE TROUBLE

Kansas City, Mo.—Editor Motor Age—Through the Readers' Clearing House will Motor Age please advise me regarding my foot brake troubles. The foot brakes have been newly lined with raybestos and they do not seem to hold. I have taken them off and scraped the raybestos off with a file and soaked them in gasoline, put them back on again, but without results. I will appreciate any information Motor Age can give me on this.—W. J. Zeh.

There is probably something wrong with your brake adjustments which prevents the bands from taking hold of the drums all around. If the brake shoes are of stiff metal it is possible that the wheel bearings are out of adjustment so that the shoes are not concentric with the brake drums. If the brake shoes are of a flexible metal, the trouble is perhaps due to adjustment of the operating mechanisms. The cams which are employed to separate or expand the shoes of internal brakes sometimes become so badly worn that the shoes cannot be sufficiently expanded to hold; and the pins on which the shoes are pivoted often become rusted to the shoes for want of lubrication, thus rendering the brakes almost useless. If you had given the name of your car Motor Age could very readily get at the seat of your trouble, different brake designs are subject to different troubles.

NEW WYOMING BRIDGE

Rawlins, Colo.—Editor Motor Age—I am sending herewith a photograph of the newly completed bridge across the North Platte river at Fort Steele, Wyo. Including approaches this bridge is 750 feet long and is of great benefit to motorists this summer. A short description of this bridge appeared in Motor Age May 26, page 24. —E. Sundin.

TROUBLE WITH TIMER

Shelbina, Mo.—Editor Motor Age—Will Motor Age inform me what is the probable cause of my two-cylinder model A Maxwell missing on slightly or very high speed. It can only be detected with the cut-out open. The batteries are good, contacts are good both in the doil and commutator, or timer. The contacts on the timer are slightly worn, but I have bent them in so that they make a strong contact. The motor sometimes chokes or misses after running with the throttle nearly closed and suddenly opens up.—J. C. Jewett.

Your trouble is most probably due to weak coil springs on the blades of the timer, which at very high speeds fail to bring the blades back to the cam quickly enough to prevent occasional misfiring. This may be remedied by getting new springs, or by cutting a coil or so off the old ones. It is possible that by adjusting the air valve so that it will open a little more, or at least a little more readily, you may be able to get away from the choking which occurs under the above mentioned conditions. This, however, is characteristic of most carbureters, and the fault is with the driver rather than with the carbureter; one should not open the throttle suddenly.

GNOME MOTOR DESIGN AND CONSTRUCTION

By W. F. Bradley

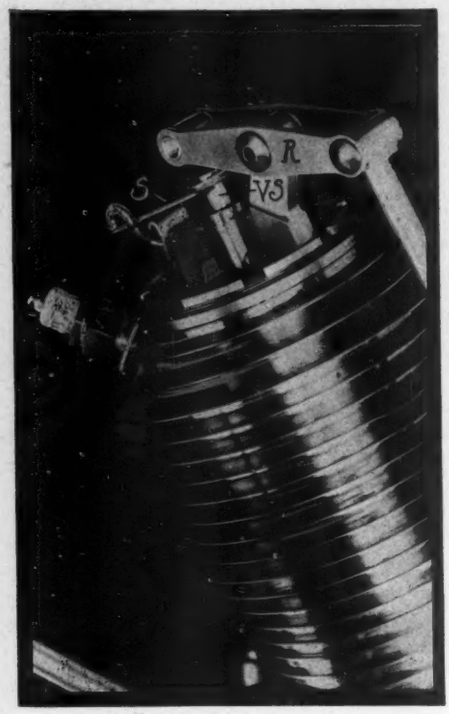


FIG. 1—GNOME MOTOR EXHAUST VALVE

IT CANNOT be denied that the most widely-used and the most successful aeroplane motor in existence is the seven-cylinder revolving air-cooled Gnome, made in France. For a total weight of 167 pounds this motor develops 45 to 47 horsepower at 1,000 revolutions, being equal to 3.55 pounds per horsepower, and has proved its reliability by securing all long-distance and endurance records. Quite recently the same engineers have produced a fourteen-cylinder revolving Gnome, having a nominal rating of 100 horsepower, with which world's speed records were broken at the last Rheims aviation meeting, held a short time ago, and the details of this construction will undoubtedly be of interest.

Except in the number of cylinders and a few mechanical details the fourteen-cylinder motor is identical with the seven-cylinder one; fully three-quarters of the parts used by the assemblers would do just as well for one motor as for the other. There is very little in this motor that is common to the standard type of vertical motor car engine. The fourteen cylinders are mounted radially round a circular crankcase K, Fig. 2; the crankshaft is fixed, and the entire mass of cylinders and crankcase revolves around it. The explosive mixture and the lubricating oil are admitted through the fixed hollow crankshaft, passed into the explosion chamber through an automatic intake valve in the piston head, and the spent gases exhausted through a mechanically-operated valve in the cylinder head. The course of the gases is practically a radial one.

A peculiarity of the construction of the motor is that nickel steel is used throughout. Aluminum is employed for the two oil pump housings; the single compression ring for each piston is made of brass; there are three or four brass bushes; gun metal is employed for certain pins—the rest is machined out of chrome nickel steel. The crankcase is practically a steel hoop, the depth depending on whether it has to receive seven or fourteen cylinders; it has fourteen holes bored as illustrated on its circumference in two distinct planes, and offset in relation one to the other. The cylinders, which have a bore of 4 3/10 inches and a stroke of 4 7/10 inches, are machined out of the solid bar of steel until

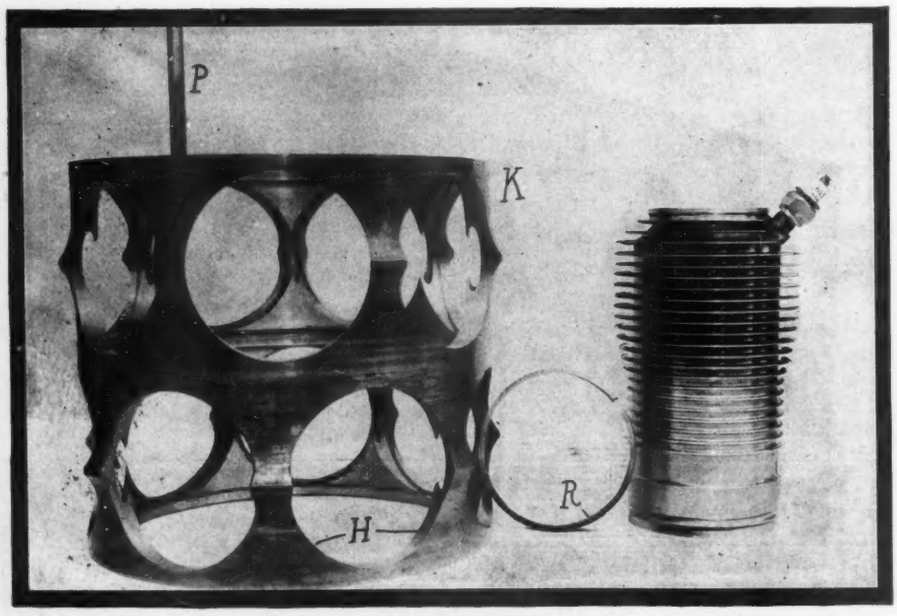


FIG. 2—CRANKCASE AND CYLINDER OF GNOME MOTOR

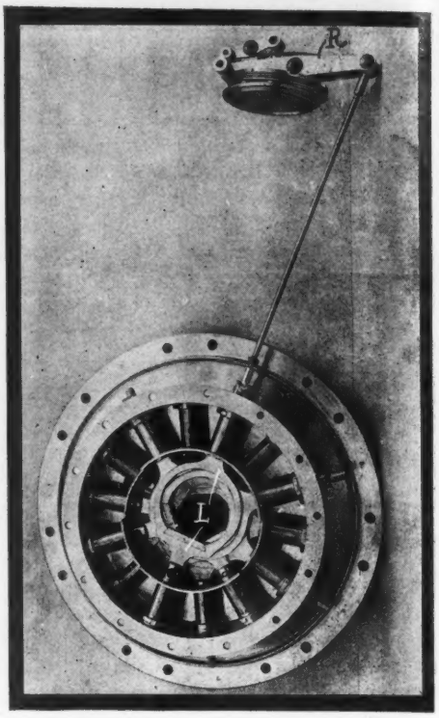


FIG. 3—OPENING GNOME EXHAUST VALVE

the thickness of the walls is only 1.5 millimetres—.05905 inch, or practically 1/20 inch. Each one has twenty-two fins which gradually taper down as the region of greatest pressure is departed from. In addition to carrying away heat, the fins assist in strengthening the walls of the cylinder. The barrel of the cylinder is slipped into the hole bored for it on the circumference of the crankcase and secured by a locking ring R—in the nature of a stout compression ring—sprung on to a groove on the base of the cylinder within the crankchamber. On each lateral face of the crankchamber are seven holes, drilled right through the chamber parallel with the crankshaft. Each one of these holes receives a stout locking pin P of such a diameter that it presses against the split rings of two adjacent cylinders; in addition each cylinder is fitted with a keyway.

The exhaust valve is mounted in the cylinder head, Fig. 1, its seating being screwed in by means of a special box spanner. On the fourteen-cylinder model the valve is operated directly by an overhead rocker arm with a gunmetal rocker R at its extremity coming in contact with the extremity of the valve stem VS. As in standard motor car practice, the valve is opened under the lift of the vertical push rod, actuated by the cam. The distinctive feature is the use of a four-blade leaf spring S with a forked end encircling the valve stems and pressing against a collar on its extremity. On the seven-cylinder model the movement is reversed, the valve being opened on the downward pull of the push rod, this lifting the outer extremity of the main rocker arm, which tips a sec-

ondary and smaller rocker arm in direct contact with the extremity of the valve stem. The springs are the same in each case.

The pistons, like the cylinders, are machined out of the solid bar of nickel steel, and have a portion of their wall cut away at C, Fig. 5, so that two adjacent ones will not come together at the extremity of their stroke. The head of the piston is slightly reduced in diameter and is provided with a groove into which is fitted a very light L-section brass split ring Z; back of this ring and carried within the groove is sprung a light steel compression ring, serving to keep the brass ring in expansion.

As already mentioned, the intake valves are automatic, and are mounted in the head of the piston. The valve seating is in halves, the lower portion being made to receive the wrist pin and connecting rod, and the upper portion, carrying the valve, being screwed into it. The spring is composed of four flat blades, with the hollowed stem of the automatic valve passing through their center and their two extremities attached to small levers calculated to give balance against centrifugal force. The springs are naturally within the piston, and are lubricated by splash from the crankchamber. They are a delicate construction, for it is necessary that they shall be accurately balanced so as to have no tendency to fly open under the action of centrifugal force. The intake valve is withdrawn by the use of special tools through the cylinder head, the exhaust valve being first dismounted.

The fourteen-cylinder motor has a two-throw crankshaft with the throws placed at 180 degrees, each one receiving seven connecting rods. The parts are the same as for the seven-cylinder motor, the larger one consisting of two groups placed side by side. For each group of seven cylinders there is one main connecting rod, together with six auxiliary rods. The main connecting rod, D, which, like the others, is of H section, has machined with it two L-section rings R1 bored with six holes—51½ degrees apart to take the six other connecting rods. The cage of the main connecting rod carries two ball races BR, one on either side, fitting onto the crankpin and receiving the thrust of the seven connecting rods. The auxiliary connecting rods are secured in position in each case by a hollow steel pin P passing through the two rings. It is evident that there is a slightly greater angularity for the six shorter rods, known as auxiliary connecting rods, than for the longer main rods; this does not appear to have any influence on the running of the motor.

Coming to the manner in which the exhaust valves are operated, this at first sight appears to be one of the most complicated parts of the motor, probably because it is one in which standard practice is most widely departed from. Within the cylindrical casing bolted to the rear face of the crankcase are seven thin flat-faced steel rings L, Fig. 3, forming female cams. Across a diameter of each ring is a pair of projecting rods fitting in brass guides and having their extremities terminating in a knuckle eye receiving the adjustable push rods operating the overhead rocker arms R of the exhaust valve. The guides are not all in the same plane, the difference being equal to the thickness of the steel rings, the total thickness being practically 2 inches. Within the female cams is a group of seven male cams of the same total thickness as the former and rotating within them. As the boss of the male cam comes in contact with the flattened portion of the ring forming the female cam, the arm is pushed outward and the exhaust valve opened through the medium of the push rod and overhead rocker.

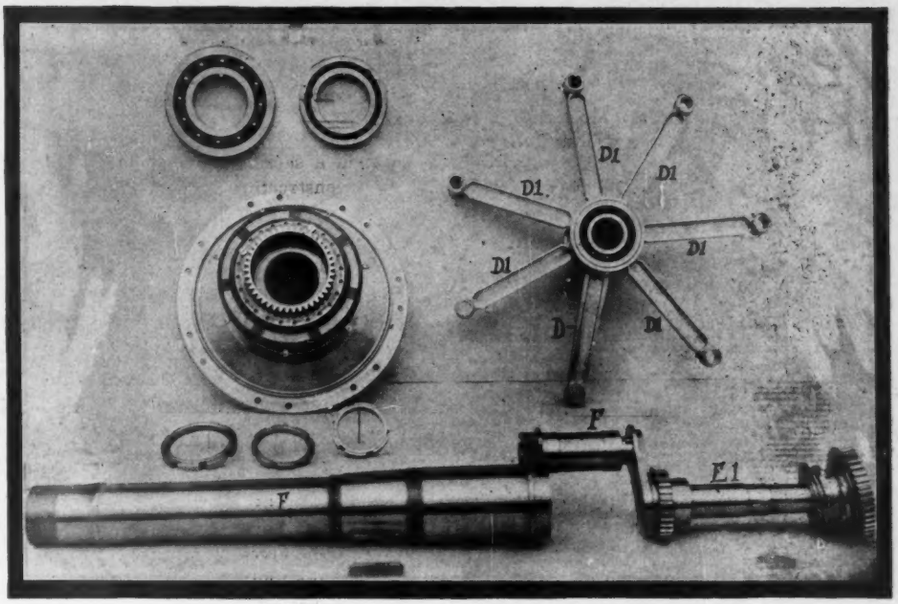


FIG. 4—CRANKSHAFT AND CONNECTING RODS ON GNOME MOTOR

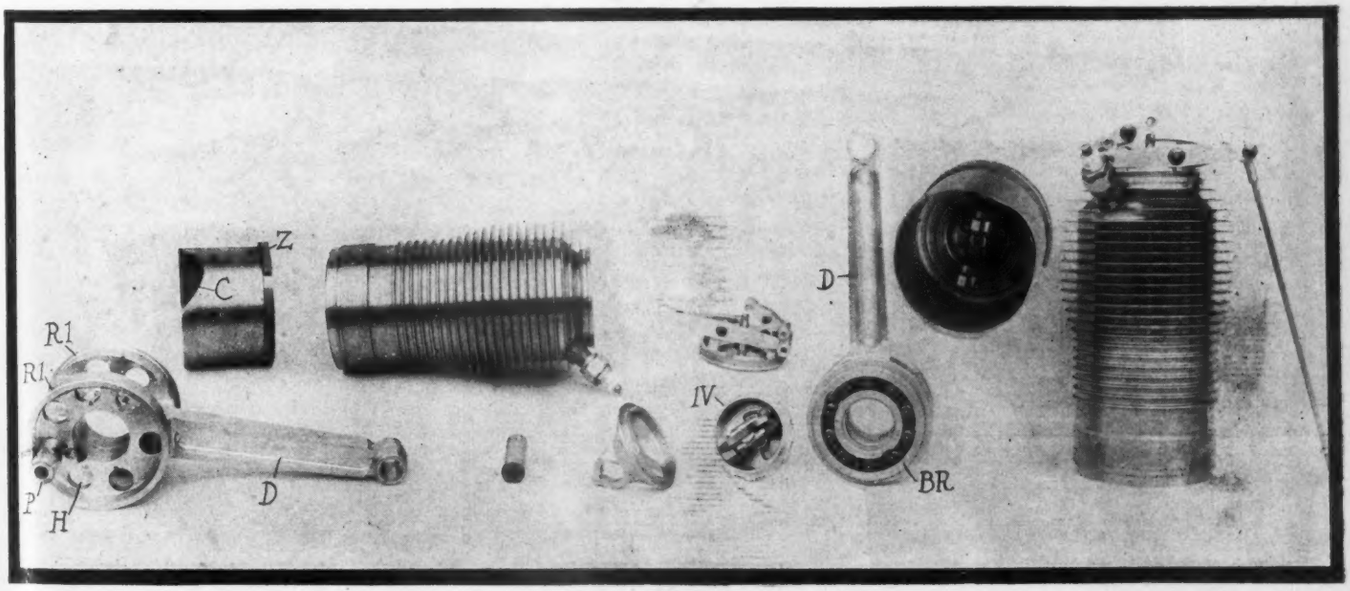


FIG. 5—GNOME PISTON, MAIN CONNECTING ROD, INTAKE VALVE AND EXHAUST VALVE

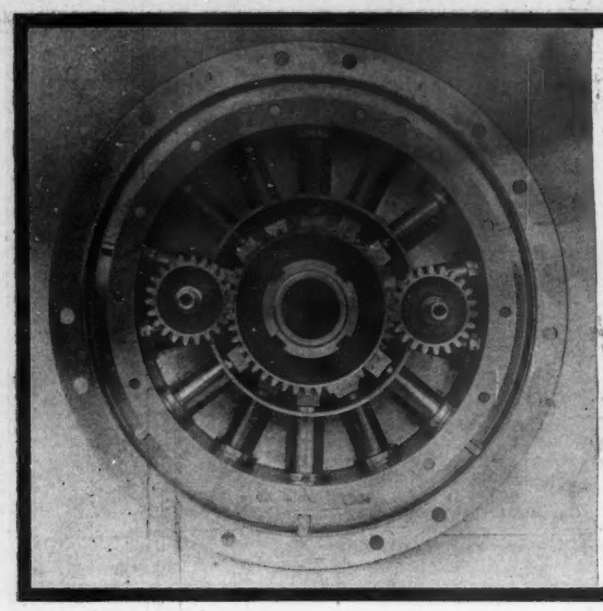


FIG. 6—THE FOURTEEN VALVE PUSH RODS

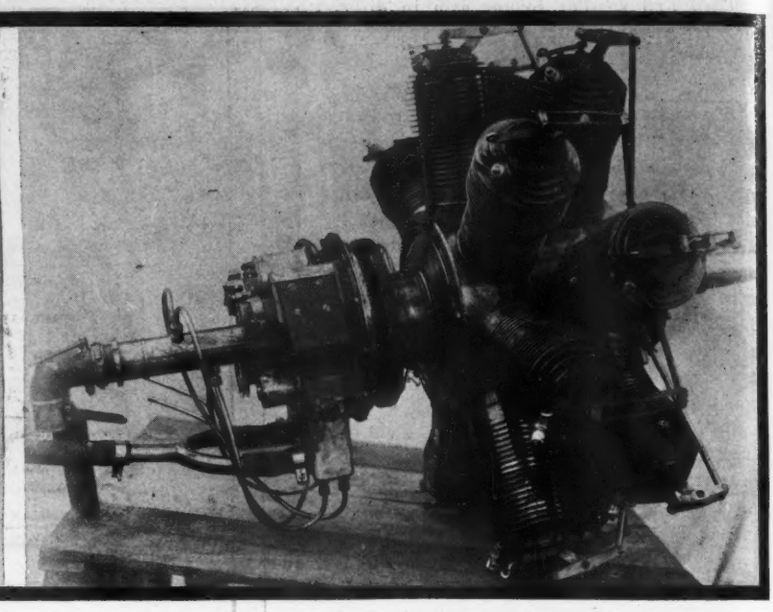


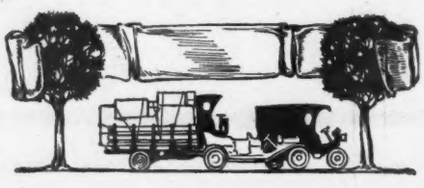
FIG. 7—GNOME MAGNETO AND CARBURETER

The number of cams is the same for the fourteen as for the seven-cylinder motor; on the latter, however, there is but one flattened portion in the female cam ring, and only one of the projecting arms terminates in a knuckle to receive the adjustable push rod, the opposite arm being merely a guide. The flattened portion is at the guide side; thus, when the male cam comes in contact with it the arm is caused to descend in its guide and a pull exerted on what has come to be known as the push rod. For the fourteen-cylinder motor the action is direct, for there are two flattened portions on the female cam ring, one at the base of each projecting arm, and they are lifted in exactly the same manner as the tappets of a standard type of motor. The group of male cams is driven primarily by a pinion on the crankshaft in mesh with two intermediate pinions, transferring their motion to the male cam pinion gear turning free on the extremity of the crankshaft.

On the face of the crankcase opposite to the valve mechanism is a bolted-on end plate, carrying a pinion for driving the two magnetos and the two oil pumps, and having bolted to it the distributor for the high-tension current. Each group of seven cylinders has its own magneto and lubricating pump. The two magnetos and the two pumps are mounted on the fixed platform carrying the stationary crankshaft, being driven by the pinion on the revolving crankchamber. The magnetos are geared up in the proportion of 4 to 7. Mounted on the end plate back of the driving pinion are the two high-tension distributor plates, each one with seven brass segments let into it and connection made to the plugs by means of plain brass wire. The wire passes through a hole in the plug and is then wrapped round itself, giving a loose connection. The current is led from the high-tension terminal of each magneto to a fixed carbon brush bolted to the base plate receiving the crankshaft; the distributor, revolving with the crankcase, feeds the current to the plugs as each of its segments comes opposite the brush.

The motor fires on alternate cylinders, thus: 1, 3, 5, 7, 2, 4, 6, giving for each group three and one-half explosions per engine revolution, or seven for two revolutions. The fourteen cylinder model, consisting of two groups of seven; No. 2 motor alternates with No. 1, giving seven explosions per revolution. It is only possible to make a practical revolving motor, or a fixed motor with the cylinders radiating from a circular crankcase, by employing an odd number of cylinders. With any other combination it is impossible to obtain a perfect firing balance. Gnome, however, is the only maker in France employing seven cylinders; others started with the same number, but have since changed to five cylinders, still firing on alternate cylinders and obtaining five explosions for two revolutions of the motor or motor shaft.

The crankshaft of the Gnome, as already explained, is fixed and hollow. For the seven-cylinder motor it has a single throw, and for the fourteen-cylinder model has two throws at 180 degrees. It is of the built-up type, this being necessary on account of the original mounting of the connecting rods. Considering the seven-cylinder model only for simplicity, one-half consists of a long straight hollow shaft, E, Fig. 4, the diameter being greater at the inner than at the outer end of the web, and of the hollow crankpin F. The other half consists of a shorter hollow shaft E1



on which are mounted the pinion driving the valve operating mechanism, the group of seven male cams with their pinion, the web, and a rather small-diameter tapered crankpin passing through the larger-diametered crankpin, and being secured by a nut on its extremity. Alignment of the halves of the shaft is maintained by two projecting studs on the face of the internal pin fitting into corresponding holes on the external pin.

Advantage is taken of the hollow shaft to supply fuel and lubricant to the motor. There is no carbureter in the usual acceptation of that term, the substitute consisting of a brass elbow mounted to the hollow end of the fixed crankshaft. Within the elbow is an ordinary type of butterfly throttle, and around its vertical portion an ordinary air sleeve, generally employed only for starting. Gasoline is brought to this carbureter—which is really not designed to carburate—by means of a copper tube with a slightly restricted outlet. There is neither float chamber nor jet. In many of the tests made at the factory we have seen the fourteen-cylinder motor run with the extremity of the gasoline pipe pushed into the hollow crankshaft, speed being regulated entirely by increasing or decreasing the flow through the tap in the base of the tank. Even under these conditions the motor has been throttled down to run at 350 revolutions without misfiring. Its normal speed is 1,000 to 1,200 revolutions a minute. From the crankchamber the mixture passes into the cylinders through the automatic intake valve mounted in the head of each piston.

The lubricant, consisting of pure castor oil, is fed to the two pumps by gravity and delivered from them through the sight feeds carried in any suitable position to tubes mounted within the hollow shaft. The oil is thus taken direct to the main bearings, to the crankpins and to the connecting rod ends. The oil driven through

the bearings into the crankchamber suffices for lubricating the cylinder walls, but a large amount is taken into the combustion chambers with the mixture and driven out with the exhaust. It is this feature which makes the Gnome a considerable consumer of lubricant, the makers' estimate being 7 pints an hour for the 100-horsepower motor; but in practice this is largely exceeded. The gasoline consumption is given as 300 to 350 grammes per horsepower. The total weight of the fourteen-cylinder motor is 220 pounds without fuel or lubricating oil. Its full power is developed at 1,200 revolutions, and at this speed about 6 horsepower is lost in overcoming air resistance. Cooling has never presented any difficulties, the temperature of the fins immediately after a flight in cold weather rarely exceeding 30 degrees Fahrenheit, or so low that the hand can be placed on the cylinder. Under hot weather conditions the temperature may rise to 150 degrees Fahrenheit, but even this gives a very wide margin of safety.

Motor Car Principles

"Principes D'Automobile," by Charles Laville, is a 168-page, paper-covered treatise dealing with the component parts of a motor car. The book is profusely illustrated and is written entirely in French. The book is divided into two parts, the first portion dealing with instructions for the novice, and the motor, the chassis and the transmission are also dealt with. The second part covers the carbureter problem, cooling, lubrication, illumination, the magneto, clutch, chassis suspension, brakes, accessories, etc. The book is published by H. Dunod & E. Pinat, Paris.

The Florence Country

"In and Out of Florence," which has a domestic flavor as well as being a guide to Florence, old and new, is a particularly pleasing account of the author's experiences and observations during a year's leisurely sojourn in the Tuscan city. Mr. Vernon, in a chatty style, tells how he and his wife established themselves in a rose-colored villa on the Settignamo hills and surrounded themselves with Italian servants, to whose competency he pays the following real live compliment: "And such servants. Servants who neither are inferiors nor superior insolents; servants who serve as friends serve, happy in their work and making us happy, making the days full of songs and good cheer, full of the joy of being alive in a land of sunshine and flowers and beauty." The greater portion of the book, however, is devoted to artistic and historical Florence, Florence the city of heroic deeds, the mecca of art lovers and students. There are trips to the art galleries, to the castles and palaces, to the churches and monastaries, to the home of the Tuscan's straw industry, and many, many other picturesque and interesting points, all of which the author has tersely and graphically described. The book is profusely illustrated with drawings of typical scenes in and around Florence by Maud Lamktree, and photographs of the masterpieces, famous statues and carvings. The volume by Max Vernon is published by Henry Holt & Co.

It is the duty of every motorist to be fully cognizant of the legal status of motoring, and to this end he will find "Road Rights of Motorists," by Twyman O. Abbott, which has been brought down to the current year, contains just the information that every motorist ought to know as to his rights and duties. This little red volume, which can be easily carried in the pocket, contains in compact form the general rules of the road, which Mr. Abbott has compiled from the statutes and decisions of the various states, covering such subjects as the law on the use of the highway, speed regulations, responsibility of accidents rights of garage keepers and the meaning of negligence. The complete motor vehicle statutes also appear in alphabetical order of all the states having such legislation. The book is published by the Outing Publishing Co., New York.

Alternating Current Motors

"Alternating Current Motors" by A. S. McAllister, and from the press of the McGraw-Hill Book Co., New York, in its third edition is a 322-paged volume. In this, its latest edition, which has been revised and enlarged, the split-pole variable-ratio synchronous converter is discussed in a simple and comprehensive manner. A chapter on synchronous motors has been added, in which the characteristics of the motor are dealt with, and the chapter on prevention of sparking in single-phase commutators motors has been very much enlarged. Ths book is profusely illustrated with tables, diagrams, formulae, etc.

Electrical Ignition

"Electrical Ignition for Motor Vehicles" deals with the subject of ignition, and is the substance of lectures delivered in response to actual questions asked. The compact little volume of 128 pages is by W. Hibbert and published by Whittaker & Co., New York. The subject of ignition in general is discussed in the introduction under such subdivisions as what is electricity, conductors and accumulators, circulators, circulation of electricity, and timing.

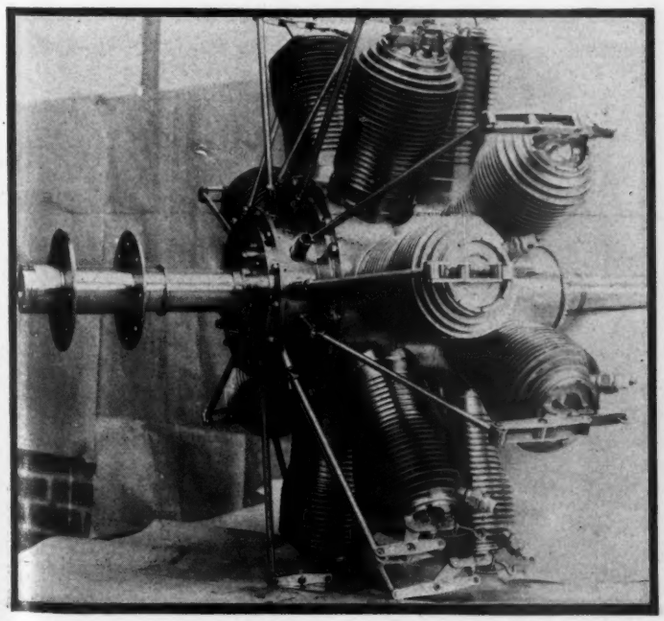


FIG. 8—GENERAL ASSEMBLY OF GNOME MOTOR

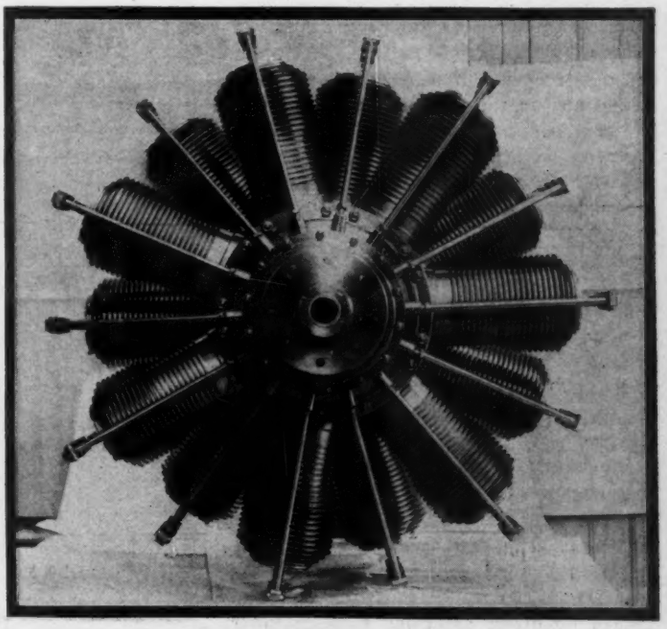


FIG. 9—END VIEW OF FOURTEEN-CYLINDER GNOME MOTOR

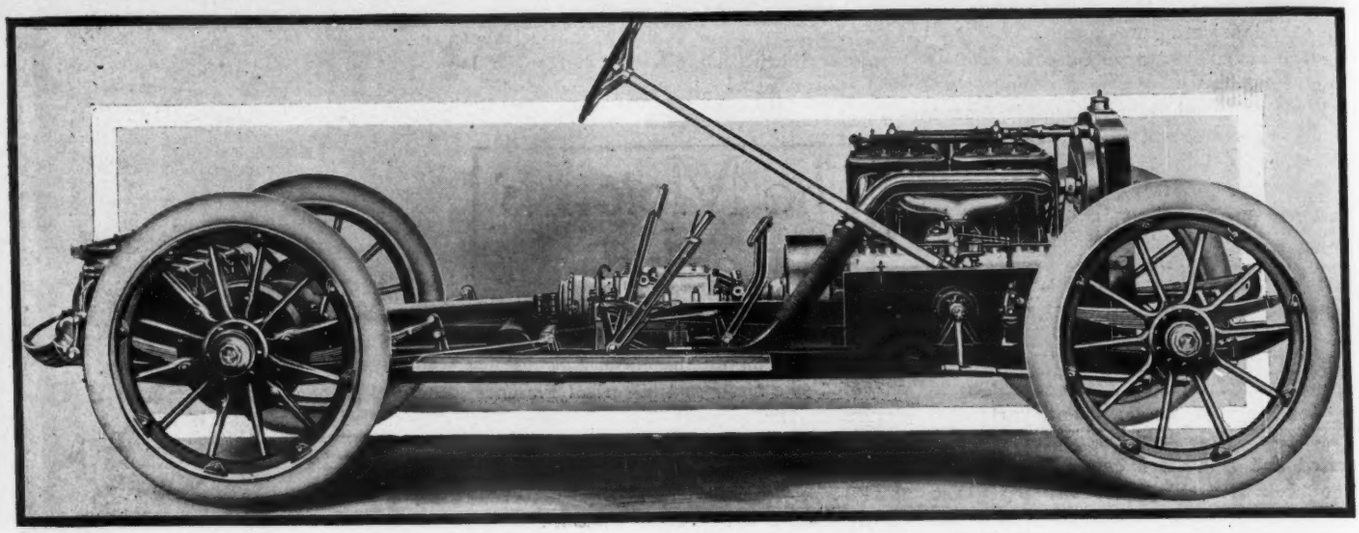


FIG. 1—AMERICAN CHASSIS FOR 1911 WITH UNDERSLUNG-FRAME DESIGN

American Cars in Two Motor and

THERE are nine 1911 models listed by the American Motor Car Co., Indianapolis, Ind. This concern, which has been practically the only exponent of the underslung frame in car construction, will continue this characteristic design for 1911 on seven of its models; the two using the overslung frame, that is the frame carried above the axle, are the limousine and the tourist, the latter being a touring car. Of the nine models one of the latest is the coupe, built for two or four-passenger service. The chassis of the coupe differs from that of all the others in having the steering wheel on the left-hand side with the control levers, emergency brake and change-speed lever placed in the center of the car so that they can be operated by the right hand of the driver. This coupe type uses the underslung frame. Although the American company in this coupe combines the most radical improvements so far as body and chassis designs are concerned, the company has nevertheless numerous alterations in the other body types. The fore door has been introduced in the torpedo roadster, Fig. 2, in the seven-passenger tourist, Fig. 4, coupe, Fig. 5, and also in the four-passenger car, Fig. 9. This use of the front door has already marked itself as perhaps the most pronounced body characteristic for the coming season.

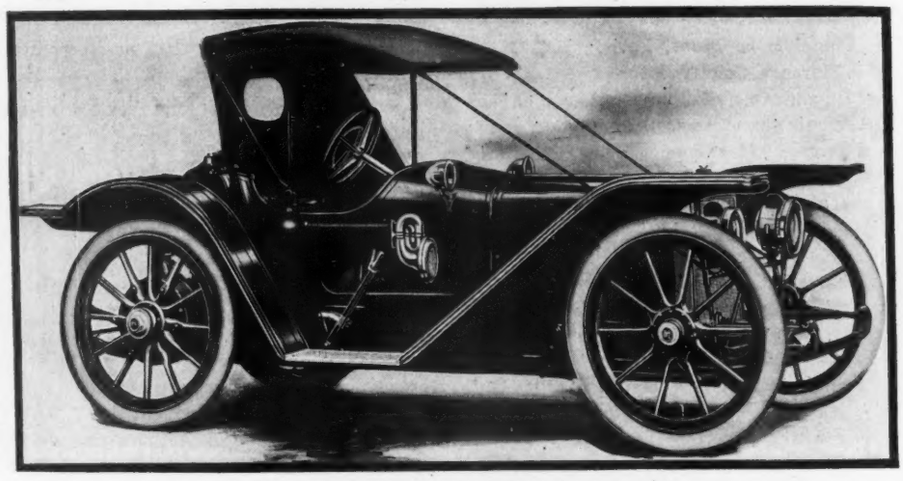


FIG. 2—AMERICAN TORPEDO ROADSTER FOR 1911

Minor Changes Made

But the alterations in American cars for 1911 are not all confined to the body design. There have been changes in the chassis and also in the motor, gearbox and rear axle. Roughly speaking, the company manufactures two chassis, one with the 50-horsepower motor, 5⅜-inch bore, and 5½-inch stroke, and the other with a 60-horsepower motor, 5¾-inch bore, and 5½-inch stroke. The 50-horsepower motor is illustrated in Figs. 3 and 6, and is characterized by cylinders cast in paris with both sets of valves on the right side and opened by direct actuation through lifter rods from the camshaft within the crank-

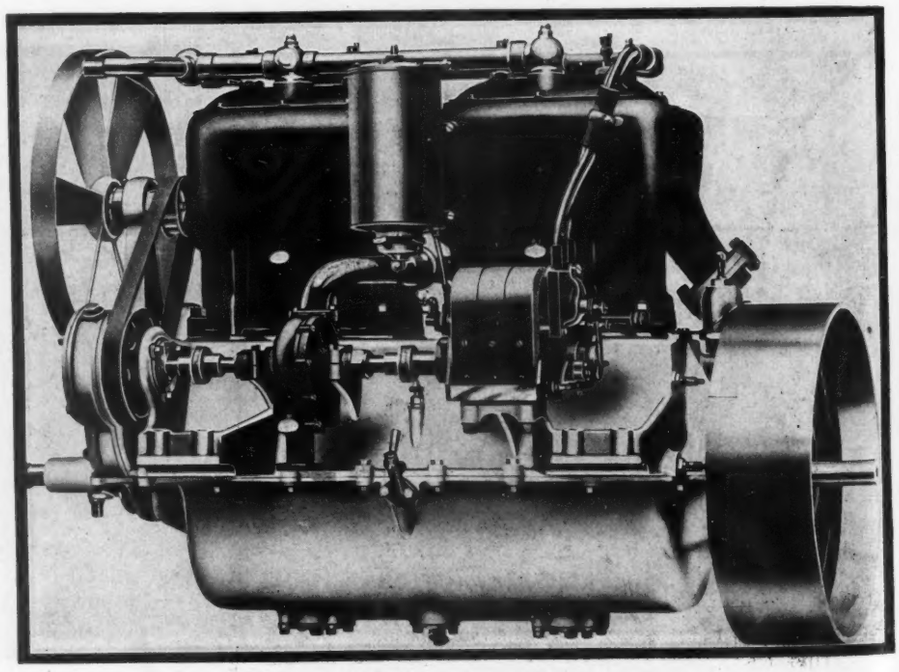


FIG. 3—THE MAGNETO SIDE OF 1911 AMERICAN MOTOR

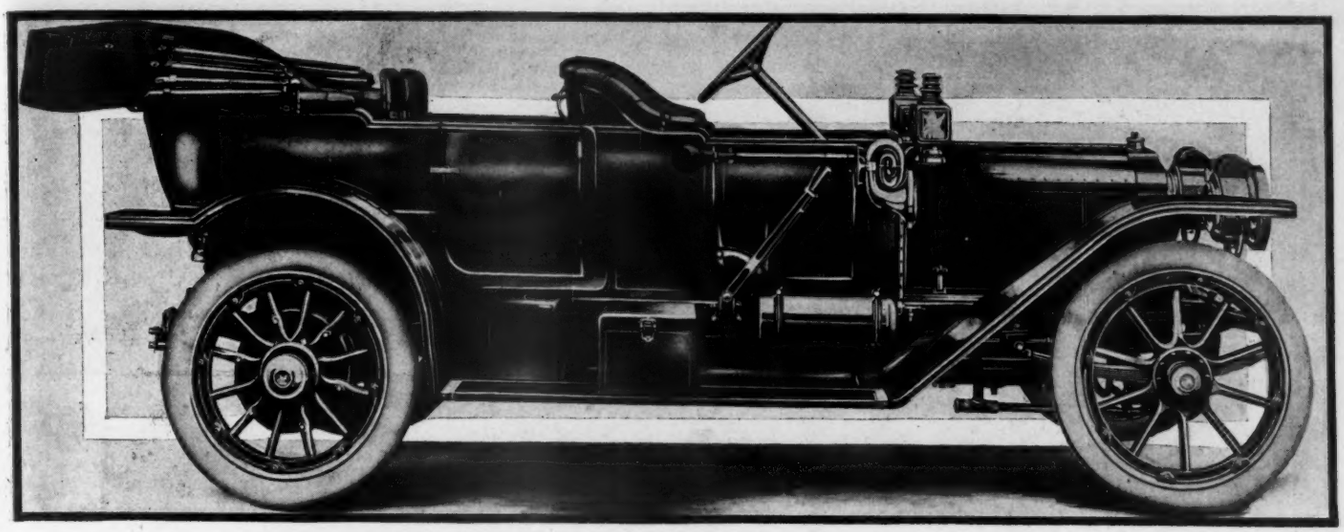


FIG. 4—SEVEN-PASSENGER AMERICAN TOURIST WITH OVERHUNG FRAME

Chassis Sizes for the 1911 Market

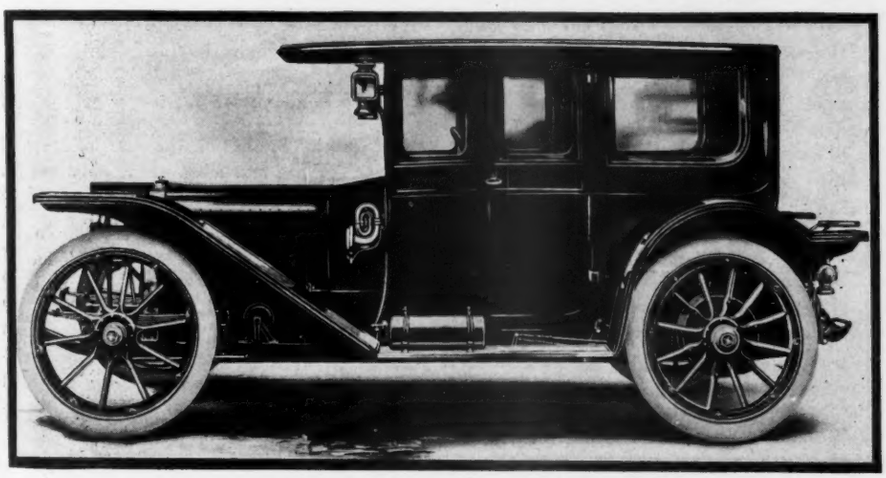


FIG. 5—AMERICAN TRAVELLER COUPE WITH LEFT-HAND CONTROL

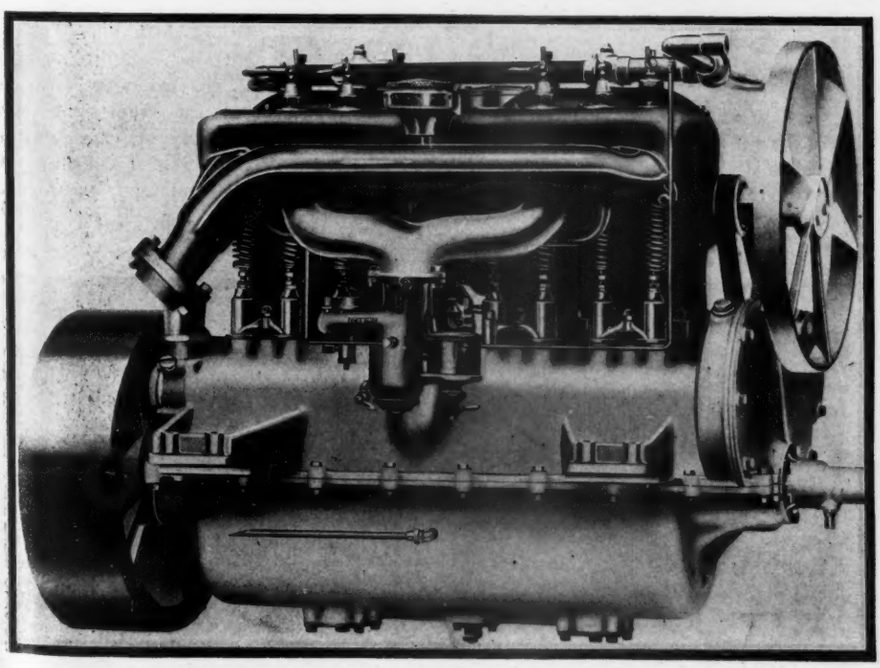


FIG. 6—THE VALVE SIDE OF AMERICAN 50 MOTOR FOR 1911

case. In the 60-horsepower motor, not illustrated herewith, the intake valves are mounted above the exhausts, the use of overhead rocker arms being necessary to open the intakes. This, together with the larger bore, constitutes practically the only difference in the two chassis, the clutch, gearbox and rear axle construction being the same in the 50 and 60 types. One other noticeable difference which the company makes is that only two wheelbases are given for all models, this being 112 inches for two-passenger cars, and 124 inches for all other body types. These measurements apply to the 50 and 60 designs.

Two Wheelbases Used

Fig. 1 illustrates the characteristic lines of the American chassis with its underslung frame, showing as it does the motor and gearbox supported on a superframe. From the gearbox a propellor shaft, located within the torsion tube, transmits to the rear axle. This torsion tube is carried with its forward end in a ball-and-socket support on a cross member of the frame.

By reference to Figs. 3 and 6 the symmetrical arrangement of the motor parts becomes apparent. On the left side the magneto and pump are mounted, being driven through the same shaft with jaw couplings permitting of removing either without molesting the other. The forward end of this shaft also takes a pulley from which the fan is driven. Centrally located on this side is a large reservoir. Locating all of these parts on the left leaves the right side free to take the carbureter and intake and exhaust manifolds, which manifolds by virtue of their high location leave all the eight valve springs very accessible. Special care has been bestowed on the lubrication of the motor, the 1911 season being the second one in which the circulating system is employed. The oil is forced by gear-driven pump, located in the base of the crankcase, through a brass tube cast into the case, and leading from the oil pump. Two flexible steel tubes con-

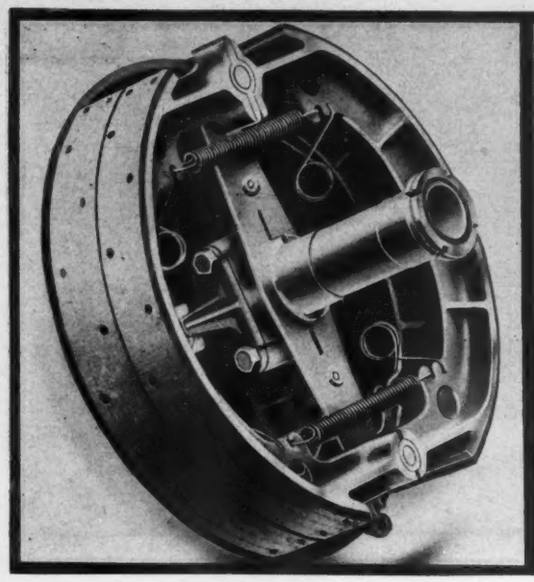


FIG. 7—DOUBLE BRAKES USED IN THE AMERICAN CAR

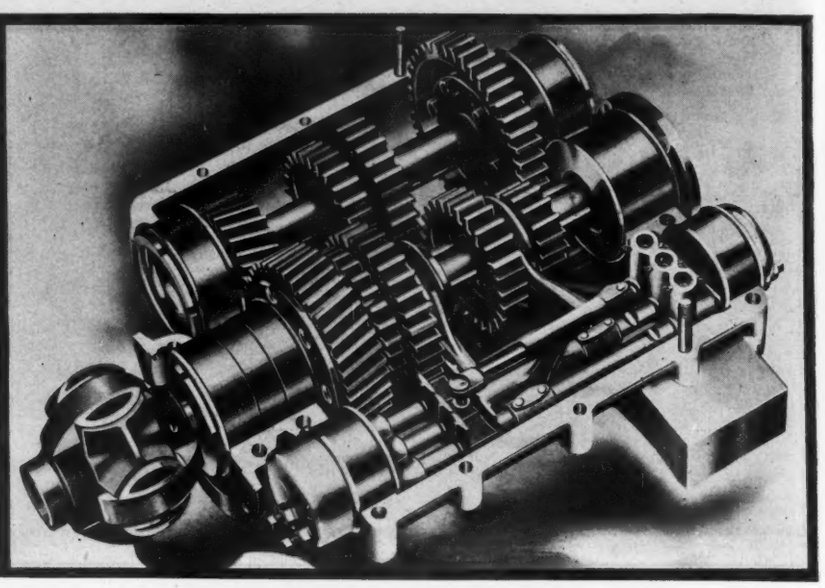


FIG. 8—FOUR-SPEED SELECTIVE GEARSET USED ON AMERICAN

vey the oil to and from the sight feed indicator upon the dash. The oil then flows to the four cylinder walls through two leads, one branching to the two front cylinders and the other branching to the rear pair. Within the crankcase a regular splash level is maintained, the capacity being 1½ gallons. On the roadster speedster and roadster special models an auxiliary oil tank with 8 gallons capacity is used, whereas on all of the other models the extra supply is limited to 2 gallons. One conspicuous feature in conjunction with these models is a lever on the left side of the crankcase shown in Fig. 3 in conjunction with the lower portion of the crankcase, by means of which lever the oil level in the crankcase can be regulated, the level being raised if more lubrication is necessary, or lowered if a reduction of oil is considered desirable. In this oiling system, as in all systems of the circulating type, the oil is filtered between successive circuits through the motor.

Using Dual Ignition

The Bosch dual ignition system is fitted, necessitating but one set of plugs with current for starting taken from a storage battery and the voltage stepped up through the Bosch single-unit coil, which coil is carried with its switch flush with the toeboard, thereby doing away with any dash encumbrance. A kick switch is used in conjunction with the Bosch coil. The usual American cable supports from the magneto to the plugs are fitted.

No change has been made in the cooling system. Each cylinder pair has integral waterjackets and the circulation is provoked by a centrifugal pump. The return water pipe from the cylinder heads branches in front of the forward cylinder, one branch going to each side of the radiator, the same as frequently used in thermo-syphon cooling. A belt-driven fan is used.

The American company has been an exponent of cone clutches since its inception, and for next year the only alteration made in the clutch is the use of rubber inserts under the asbestos clutch facing. The presence of these rubber inserts is intended to ease clutch engagement the same as is done by coil or leaf springs in many designs of cone clutches with leather facing.

The gearbox, illustrated in Fig. 8, is a four-speed type with direct drive on the fourth. It is of that conventional selective design with the gearbox made in upper and lower halves and the main and countershaft mounted in the same horizontal plane. One conspicuous improvement is the use of spiral gears for driving from the short shaft to the countershaft, as illustrated. This is somewhat new in gearbox practice but should result in quieter gears. All of the sliding units are carried on the mainshaft. Direct drive is by the internal gear method locking the clutch shaft to the mainshaft of the gearset. Enclosing all three shifter rods for sliding gears gives a dust and oil-proof construction.

One change noted in conjunction with the brakes is the adoption of pressed steel drums on the rear wheels. These drums are double width, owing to both sets of brakes being of the expansion type and placed side by side. Both are fabric lined and expanded by cam, there being the as the brake control is freed.

New Brake Drums

In conjunction with the brake improvement might be noted the use of forged sleeves for the rear axle. It is only within the lastt couple of seasons forgings have been adopted for rear axle construction and where it has been adopted it has invariably been with high-priced machines.

With the American models the question of clearance has been a debatable subject due to the underslung frame. The company announces the clearance for its 1911 models as follows: 12¼ inches in the traveler special, traveler coupe, and the traveler model; 10¼ inches in the roadster, roadster coupe, tourist and limousine; and 8 inches in the speedster and roadster special, and 36-inch wheels are used and 10-inch clearance with 40-inch wheels.

The underslung frame construction consists of standard channel steel sections turned upwards at the front and rear. Semi-elliptic springs support these frame members, the spring being of the same design as used with overslung frames. The I-beam front axle is located in front of the radiator.

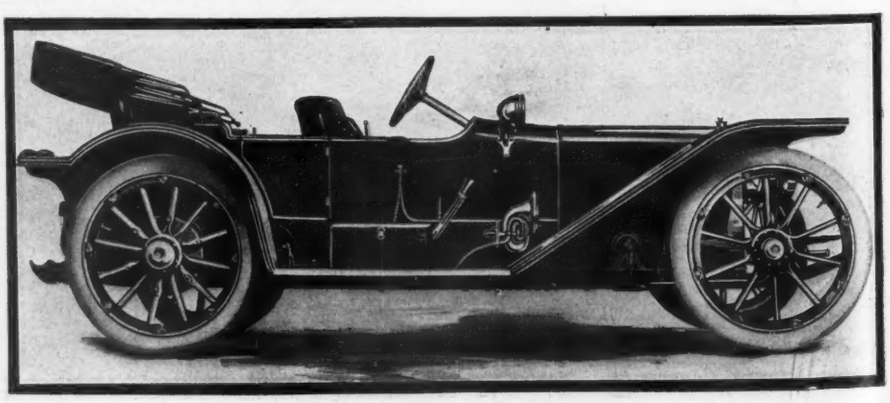


FIG. 9—THE FOUR-PASSENGER AMERICAN TORPEDO DESIGN

GILBERT-TYPE CONTINENTAL DEMOUNTABLE

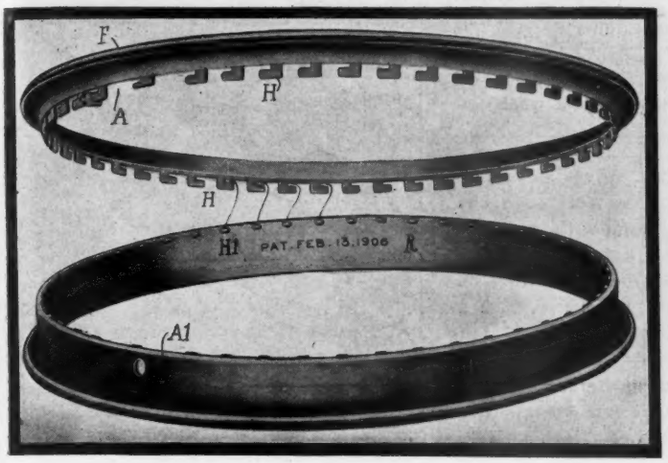


FIG. 1—REMOVABLE LIP F OF CONTINENTAL QUICK-DETACHABLE

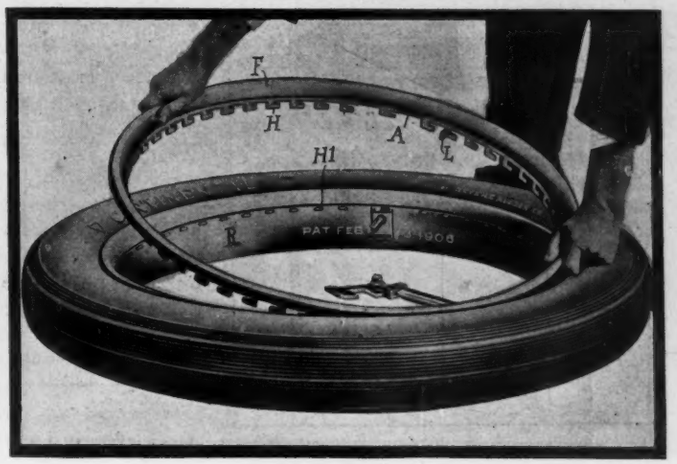


FIG. 2—OPERATING THE CONTINENTAL QUICK-DETACHABLE

ONE of the first announcements relative to demountable rims for 1911 comes from the Conttinental Caoutchouc Co., New York, in the form of the new Gilbert-type Continental demountable combined with quick-detachable features. Those familiar with demountable rims will recall that up to the present the Continental demountable has been a clincher type rim without any quick-detachable feature such as has been possible with some other makes of demountables. The 1911 Continental is a quick-detachable type, as illustrated in Figs. 1, 2 and 3; but little change has been made in the demountable feature, that is, the method of securing the rim with tire on the felloe of the wheel, the system employed at present being continued, namely, that of using eight wedges W, Fig. 4, for anchoring the rim with tire to the wheel felloe.

In Fig. 1 is admirably illustrated the quick-detachable feature of the new Gilbert-type Continental rim. The main rim R has one permanent clincher lip, but the lip F on the other side is detachable, as shown in the illustration. This lip is made with a series of hooks H and is rigidly coupled to the rim R by being slipped within it so that the hooks H drop between the elevations H1 on the rim. The method of inserting the detachable lip F appears in Fig. 2, and as soon as inserted, by means of a tool illustrated in Fig. 3, the detachable part F is given a fractional rotation or turn within the rim R, so that the hooks H engage the elevations H1, thus forming a bayonet-type lock around the entire rim. In Fig. 3 the operator is shown in the act of commencing the part rotation of the lip F. Once this is completed, a hinged piece L serves as a locking device to prevent the return rotations of F, and thereby insuring the rigid union of the permanent rim R with its demountable part F. This is the sum total of the quick-detachable feature, excepting in that the lip is marked at A and there is a corresponding mark A1 on the rim—see Fig. 1—in order to facilitate removal of the lip.

Coming next to the demountable feature of this rim, it will suffice to state that at the present there is a series of eight horizontal bolts in the wheel felloe, each bolt taking a wedge W, which is inserted between the wheel felloe and the rim R. Specially-contrived locking nuts are used on these bolts, so that in changing a rim on the road there is no danger of the nuts dropping off and getting lost. The latest design also looks after the matter of freeing the bolts from bending strain, that is, not carrying the car weight on these bolts, and so having a tendency to cause the ends of the bolts to bend in the direction of the wheel hub. This is an important improvement. A notable feature in conjunction with the rim is that when placed on the wheel the lip F is to the inside, whereas on all other quick-detachables the removable lip is to the outside. It has been necessary in this case to reverse the popular design because of the detachable lip F fitting within the main rim, and as such it would be impossible for the wedges to be used on that side.

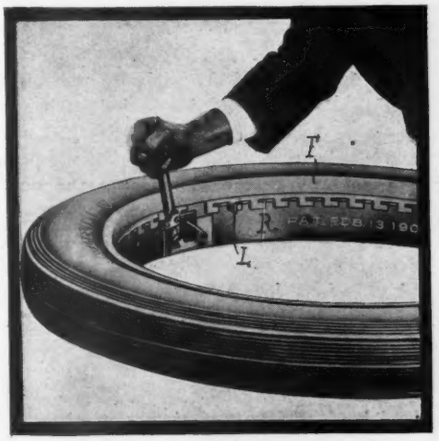


FIG. 3—LOCKING THE LIP IN PLACE

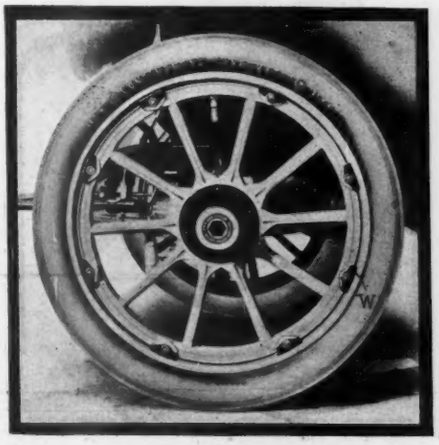


FIG. 4—THE 1911 CONTINENTAL DEMOUNTABLE

In this new Continental rim attention has been given to the matter of manufacture, the main object being the reduction of weight. This has been made possible by using metal well suited for die work. The rims being formed in dies also permit of reduction of the mass of metal used. This reduced weight is a direct economy, as continued tests have proven that heavy rims interfere with the flexibility of the motor, and so with every reduction in the rim weight there is a like possibility of reducing the flywheel weight on the motor and so increasing all around the flexibility.

NEW RONSON WRENCH

The Ronson Specialty Co., Newark, N. J., is marketing its new nine-in-one Ronson wrench. This wrench is made up of four separate branches placed side by side, and the four secured by a drop forged bolt and wing nut, the bolt having a squared shank, making it impossible for any of the wrenches to turn or twist. When ready to use the wrench is got ready by loosening one nut, pulling out the part with the sized opening required, and setting the wing nut. This wrench combines nine standard wrenches, ranging from ⅛-inch to $\frac{7}{16}$-inch in size. The wrench complete has a total length of 6 inches, the thickness of ½-inch and weighs 6 ounces.

ADVANTAGES OF VARIOUS VALVE TYPES

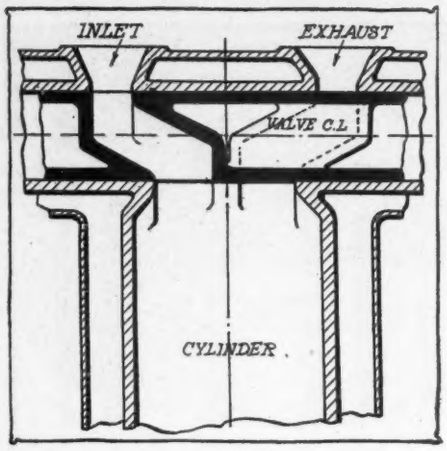


FIG. 26—HALF-TIME VALVE CONSTRUCTION SHOWING INLET AND EXHAUST PORTS OFFSET SIDEWISE

EDITOR'S NOTE—The following paper on "Slide, Rotary and Piston Valves versus Poppet Valves for Gas Engine Service," is by Eugene P. Batzell, and was read at the recent meeting of the Society of Automobile Engineers in Detroit.

(Continued from page 37 last week)

THE cylindrical rotary-valve systems which are probably the most promising for practical work are those comprising two separate single valves—one for the inlet, the other for the exhaust—and comprising two double oppositely rotating valves. A number of different arrangements of this kind are possible. Each valve can be made according to Fig. 24, Fig. 25 or Fig. 26, and also Fig. 27, or it may be constructed to serve simultaneously as a gas passage, Fig. 28. The use of this last-mentioned construction for the exhaust does not seem to promise good results, at least, with valves of sufficiently large diameter for high-speed motors without any cooling means, as represented in Fig. 28. Generally these separate inlet and exhaust rotary valves can be made of smaller diameter than the combined valves, which gives the advantage that their circumferential velocity is smaller at the same speed of revolution, and the problem of an easy-running valve is, therefore, simplified.

Inlet Port Area

For a cylinder of 5-inch bore, and with half-time valves, each with a 2-inch outside diameter and a port length of 4 inches, the inlet port area will be approximately

$$S = \pi \times \frac{52.5}{360} \times 2 \times 4 = 3.65 \text{ sq. inches.}$$

The same area is obtainable with a quarter-speed double valve and half of it with a quarter-speed single valve. This arrangement, Fig. 29, allowing under assumed conditions an inlet port of only 1.83 square inches, will not be apt to give as good results in motor power as some other systems with bigger and wider ports. In Fig. 29 the inlet valve is shown to be double, but in the particularly referred-to motor construction the inside valve member has a special destination, which will be mentioned further along. If double half-speed valves are used—which are practical only if the valves serve also as gas passages—then the port area can be made still larger; and with a 2-inch valve it will be twice that of the single, totaling 7.3 square inches—counting on the cylindrical surface. Of course, such a valve with an opening equal to 37 per cent of the piston area would give a very easy gas flow if the maximum choking effect were not transferred to another place. The inside valve of 2-inch outside diameter can give a gas passage of only 1¾ inch diameter, or 2.4 square inches area, if the gas flows to the valve port in one direction. The conditions become better when the gas flows to this port in both directions; that is, if the gas enters the interior of the inside valve from both ends. In this case only half of the total quantity of gas flows from each side through the area of 2.4 square inches. Owing to this restriction of the gas-passage area, the big-sized valve ports are practically valueless because they form only a relatively short length of the gas path. Here conditions are the exact opposite of those usually encountered with poppet valves.

The possibility of big ports for the inlets permits of reducing the period of their opening. The shortening of the inlet period will in turn slightly diminish the port area, and by further shortening the port length this area may be reduced to about 5 square inches, which equals 25 per cent of piston area, and will be sufficient for the motor at any reasonable speed. The

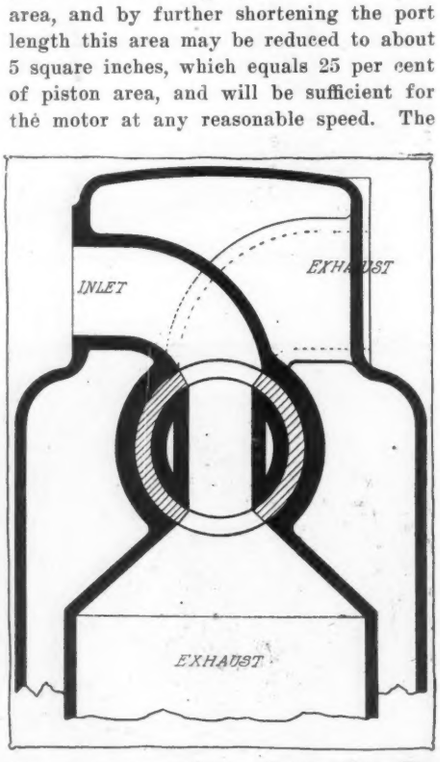


FIG. 27—QUARTER-SPEED VALVE, ONE ELEMENT ROTATING WITHIN ANOTHER

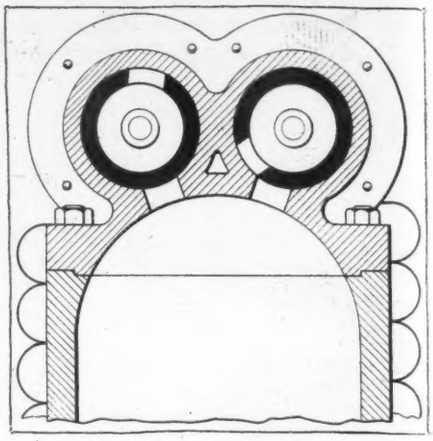


FIG. 28—CYLINDRICAL ROTARY VALVE SERVING AS GAS PASSAGE

lines v_3 in Fig. 10 constitute a diagram of a 5-square-inch valve opening for an inlet period of 210 degrees. This arrangement would be quite satisfactory from the standpoint of motor power, if similarly large exhaust opening and passages were used. But, as stated, it is hardly advisable to subject the exhaust valves to additional heat by making them outlet passages for the spent gases. Something would be gained in this respect by providing auxiliary exhaust ports controlled by a separate valve or by the piston through which the hottest gases escape. On the other hand, a half-time valve 2 inches in diameter with a port 4¼ inches long giving a 225-degree exhaust period, has an opening area of 4.15 square inches, which is probably as much as can be obtained without introducing great complication, and which, besides, is sufficient for most purposes.

Inlet Valve for Gas Passage

Generally speaking, the combination of a single- or double-inlet valve serving also as a gas passage, with a half-time exhaust valve, with an elbow or curved channel, cooled from the outside, and in case of larger size also from the inside, appears to the writer to be the most practical arrangement, see Fig 30. Auxiliary exhaust ports uncovered by the piston could be added if desired. In this construction the exhaust valve passage is opened to the cylinder before the exhaust time actually begins, which, though not desirable, is no great disadvantage.

Rotary Valves Are Best

From what has been said concerning rotary valve systems in general the conclusion may be drawn that with but few exceptions they surpass the poppet valves in respect to size and character of valve openings. Conical valves also can be used in place of the cylindrical ones, but the kind of port openings obtainable will not change greatly. The conical valves require more attention to properly fit their seats. The valve taper is generally small,

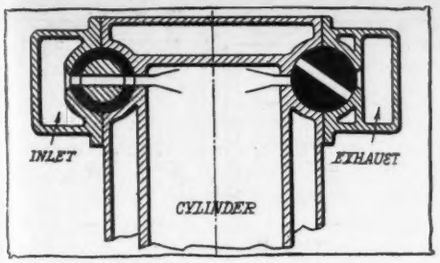


FIG. 29—DOUBLE INLET VALVE

and care is required to prevent the valve from being pressed against the seat so as to cause it to stick.

The more practical and reliable rotary valve systems, of those referred to in the past, may become strong competitors of the poppet valve, especially if they are connected with mechanical simplicity. In this respect, it should not be sufficient to make the motor look simple by concealing all complication in the crankcase, or by special covers. The proper placing of the valves so as to enable the use of the simplest driving means according to each individual case, will be considered of great importance. It does not matter whether the simplicity is obtained by placing valves in the cylinder head, at its sides or elsewhere. However, it is advisable to choose the valve place with a view to getting the most favorably shaped explosion chamber. In multi-cylinder motors some barrel valve systems will be found to be the least complicated, because a single driving means may operate the same valves of the whole cylinder row. The disk and sleeve rotary valves for multi-cylinder motors are less simple in their drives, but good results can be obtained by transmitting the drive to only one valve, from which the others are driven in train. This kind of drive with valves in adjoining cylinders revolving oppositely also conforms well with simplicity in location of ports. Generally speaking, it will be found that far more difficulty arises with that part of the valve drive which serves as an intermediate link between the valves and the motor crankshaft. Here the complication increases further if motion has to be transferred to the motor auxiliaries like water and oil pumps, ignition devices, etc. This part of the valve mechanism represents a subject too spacious in itself to be treated upon in the present article, where it will suffice to have mentioned it briefly. Through the desire to simplify the valve drive probably originated the rotary valve systems, in which a single valve serves for more than one cylinder. The valve has one inlet and one exhaust passage, which register with the cylinder ports at certain moments. These moments are in fixed relation with the cyles in both cylinders, which determines the position of the cylinder ports to each other. The valves are preferably made cylindrical and, depending on their general dimensions, will give openings similar to other systems with the same valve form. These single valves can be located over the cylinder head, at either side, with horizontal or vertical axis, etc.

Reversing and Throttling Easy

The motor of a rotary valve system generally can easily be made reversible by reversing the direction of valve rotation, or by changing the moment of the inlet relative to the exhaust, which can be accomplished by an auxiliary valve. An auxiliary valve can be used conveniently also as a throttling means for the motor. Such a valve can be placed between the inlet valve and the cylinder port, so as to alter the size of the opening, or simultaneously its size and duration. The inside member of the inlet valve in Fig. 29 serves the last purpose; it does not rotate, but can be turned more or less, whereby its channel changes the direction, altering the inlet timing and opening.

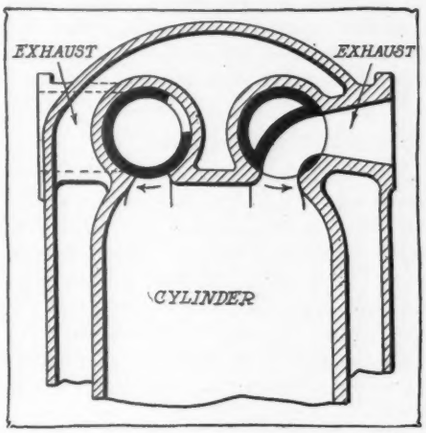


FIG. 30—INLET VALVE SERVING AS GAS PASSAGE

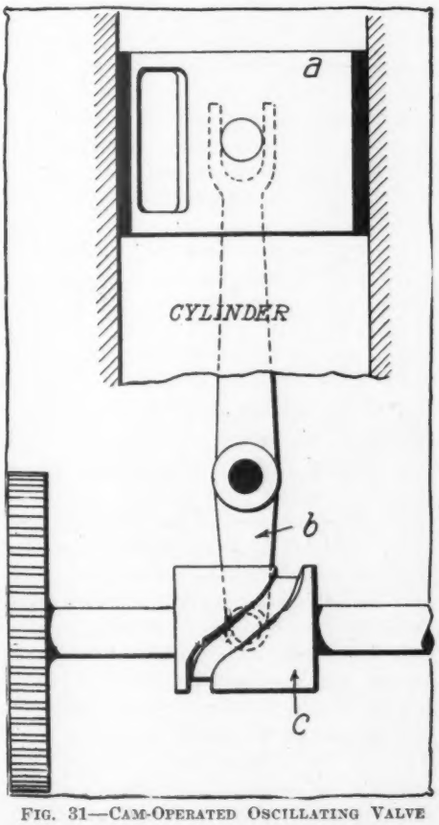


FIG. 31—CAM-OPERATED OSCILLATING VALVE

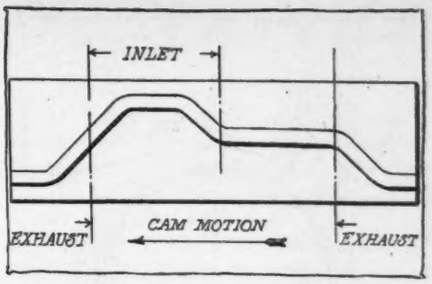


FIG. 32—DEVELOPED CAM SURFACE

However, neither reversibility nor throttling by the valves is to be considered as feature of rotary valve systems exclusively. With poppet and other valve systems these can be obtained with as little complication, though in different ways.

Oscillating Valves

Valves similar to those just described as rotary systems can also be made with an oscillating motion. With the single valves of this type, proper engine timing will be obtainable only if the valve has an irregular motion, for instance, produced from a cam, etc. This is necessary because the time from the inlet closing to the exhaust opening is much longer than the time from the exhaust closing up to the inlet opening. Double oscillating valves registering with each other similarly to double sliding valve systems can have a continuous movement from eccentrics, or otherwise. In Fig. 31 a scheme is given of a cam operated oscillating valve. The grooved cam c transfers motion to the valve a through a lever b. The valve can have a greater or smaller swing according to the cam size, the leverage and other things. We will assume the dimensions to be such that a 3-square inch maximum inlet opening is obtained. The diagram of this opening elapsing will depend upon the cam shape. We choose to make the cam so that its developed surface is like the one represented in Fig. 32, where the inlet and exhaust periods are properly indicated. It will be seen that the valve openings change in size in proportion to the revolving of the cam, but their maximum port opening remains unchanged for a certain period. If the valve opening increases and decreases at the same rate, its diagram will be a symmetrical trapezoid as given by curve v_4 in Fig. 10. The maximum port area remains constant for a period of 50 degrees crank motion. The respective theoretical intake gas velocity is represented in Fig. 10 by curve w_4. This system can be looked upon as being very favorable for motor power, but it still remains to be seen how it can be developed to become of practical value. The comparatively small movement of the valve should also give it some advantages, but, on the other hand, it would probably be difficult to preserve this mechanism from showing back lash, owing to wear in the cam and pivots.

In Fig. 33, which is a horizontal section through the motor cylinder, is shown an

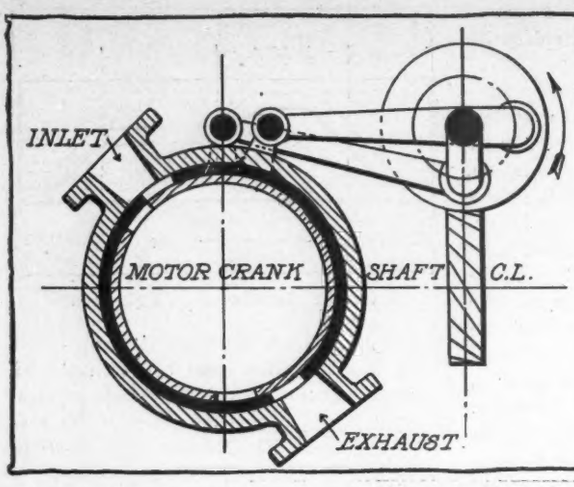


FIG. 33—HORIZONTAL SECTION THROUGH MOTOR CYLINDER SHOWING OSCILLATING DOUBLE- VALVE SYSTEM

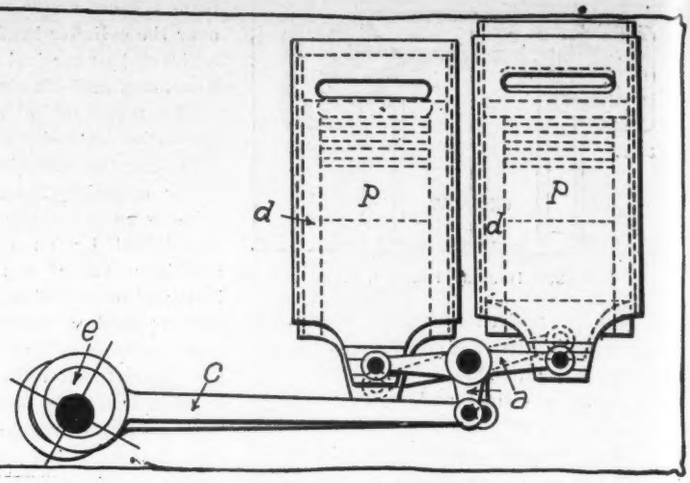


FIG. 35—A SINGLE ECCENTRIC OPERATING SLIDING SLEEVE VALVES OF A WHOLE CYLINDER ROW

oscillating double-valve system with sleeve valves operated by rods from cranks moving in horizontal planes. These cranks are rotated from the motor crankshaft by means of a pair of spiral gears. The valve port diagram is obtained in the easiest way graphically. In laying it out we assumed the radius of the valve cranks to be 1½ inch and that the outer sleeve valve is actuated from a crank, which revolves 75 degrees ahead of the other one operating the inner sleeve. The maximum inlet port size, counting on the circumference of the inner sleeve, was found to be $\frac{15}{16}$ inch, which gives a total area of 2.625 square inches with a port 2 inches high. The curve v_5 in Fig. 10*a* is the respective valve diagram. It appear to be practically an equilateral triangle also, and as such will result in a theoretical intake gas velocity curve of a shape similar to w_2 in Fig. 10, but of a slightly different scale. The curve v_5 starts and ends more lingeringly than curve v_2 and proves that the generally claimed quick opening of ports by means of a double valve mechanism operated through eccentrics occurs less quickly than with regularly moving rotary valves. The double oscillating valves of the size assumed are not noticeably different from poppet valves, in the area enclosed by their diagram curve. The curve v_8 gives a trifle quicker opening start than is obtainable with No. 1 and 2 of the roller cam follower. On the other hand, it is less quick than the curve of follower No. 3, and besides it is enclosed by all three cam follower curves during a considerable part of the following crank movement; but it can be concluded that the system after Fig. 33 is more favorable for an efficient inlet gas flow than poppet valves having a good shape of inlet port among other things.

Double Spherical Cap Valves

Some other arrangements of oscillating valves are possible besides the one just referred to. For instance, double spherical cap valves are made to fit inside or outside the spherical combustion chamber, the motion for the valves being given through a pair of eccentrics also. This system shows the same valve diagram as Fig. 33, and from a theoretical standpoint it is equal.

Valve Operating Mechanism

Regarding the construction of the valve-operating mechanism, hardly any simplification will be noticeable in oscillating valves comparatively with poppet valves; gears, shafts with cranks, or eccentrics, rods, bearings, etc., are as well required here. The care required to keep the motor in good shape of course increases with the mechanical operations. If poppet valves are liable to get out of order, the oscillating valves also have peculiarities of construction which will render their correct function only temporary, nothing being gained in this respect. For instance, places liable to cause trouble in oscillating valves are the cams, the bearings, different joints and pivots, the valve ports themselves, which can burn out, etc. Wear occurring here might result in considerable play of parts, and their correct motion in relation to each other will become changed. In this respect rotary valve systems are different. Their drive through gears and shafts is of a nature where wear is not followed by play or back lash. This drive might also become noisy, but the motor timing will be affected much less and the valve port operation always remain positive.

Sliding-Sleeve Valves

The motion of sliding-sleeve valves closely resembles that of the oscillating, the rotating movement being substituted by a straight one. Single-sleeve valves with a regular motion cannot be used here for the same reason as was mentioned in the foregoing. With a device impelling them with required irregular motion, the same sort of valve diagram can be obtained as with the system in Fig. 31. As an intermediate valve system between the single- and double-sliding sleeves, one can be interposed, which uses the main motor piston as a second valve member. There is little to say concerning this combination, as it also restricts the motor timing.

Silent Knight Motor

The double-sliding sleeve system is the most interesting in its class, because it includes the much-spoken-of Silent Knight motor. It should be of great interest to investigate the sliding-valve motion of this particular construction, though, as pointed out before, it will not differ greatly from that of the double oscillating valve like that of Fig. 33. Fig. 34 represents a front elevation of the Silent Knight motor. For the sake of uniformity we will assume a motor of 5-inch bore and 6-inch stroke, and choose our own valve dimensions; so far as the writer knows, the nearest actually built motor is 124 by 130 millimeters, or 4.88 inches by 5.11 inches. We may assume the eccentricity of the sleeve-operating eccentrics to be ½ inch each, the length of the connecting-rods to the inner sleeve 2½ inches, and that to the outer sleeve 4 inches. The height of the inlet and exhaust slots in the sleeves may be made ½ inch and their length 5¾ inches, which dimensions are pretty nearly the same as those in the 124 by 130 millimeter motor. The inlet begins when the piston is at the upper end of the stroke. At this moment the inner sleeve is in its lowest position, and the corresponding eccentric at its lower dead center. The outer sleeve with its eccentric moves 90 degrees behind that of the inner one. The valve opening may be best found in a graphical way; that of the inlet is represented in Fig. 10*a* by curve v_6. This curve v_6 is as accurate as it could be located in a drawing of twice the actual size of the mechanism. It does not show a great difference from curve v_5, and therefore all that has been said about this can be repeated in regard to the Silent Knight motor. The shape of curve v_6 confirms the conclusion to which we arrived formerly, stating that the double-valve mechanism operated from eccentrics has no advantage over other valve systems, including some poppet valve types,

as regards rapidity of port opening, closing and opening. This circumstance should refute the claims often produced in favor of the Knight motor in this respect. It is true that this motor has many advantages over the common poppet valve type, notably in respect to valve openings; but it remains slightly less favorable for motor power than some rotary valve systems. It ranges with those which give a maximum port area a little smaller than its own; through the shape of valve ports nothing being gained. As to the claimed possibility to make the Knight valve ports as large as the main piston area, it can be said that such an abnormal motor construction will hardly ever be required. The port size obtainable with some of the other systems referred to in the present article is more than sufficient for any reasonable purpose. The conclusion which we have deduced theoretically from the valve diagrams, stating that the Knight and similar motors have no great advantage over poppet valves, as far as motor power is concerned, has been confirmed in actual practice also. Some poppet valve motors have shown as much or even a greater rate of power development, together with not less flexibility.

Arguments on Knight Motor

In the current literature more has been said about the Silent Knight motor than any other silent valve system. It is proper to mention some of the points made. Prominently stands the consideration of uncertainty in sleeve lubrication. The thickness of the sleeve added to that of the cylinder walls, and the oil films between, which are heat developers, should render a good cooling of the motor more difficult. Uneven thickness of cylinder walls resulting from core shifting when casting should cause unequal distortion of the sleeves. The wear of the sleeves should be rapid and the amount of power necessary to operate the sleeves should also result in rapid wear in the valve, connecting-rods, etc. Carbon particles are easily worked in between the sleeves, also causing wear; and the exhaust ports are liable to burn out in the thin sleeves, etc. These objections met replies as follows: In regard to sleeve lubrication, it was pointed out that the sleeves were made with a play of 3/1000 inch to allow for oil. The lubrication system has proven reliable in use; and in tests which were made, a piston seized once, but not the sleeves. The sleeves transfer the heat from the cylinder inside on to a greater surface by their motion, making the cooling more effective. No wear was perceptible in the sleeves after runs of thousands of miles. The sleeves are long and present a very large bearing surface, resulting in their working under a small specific pressure. They do not require much power for their operation—less than poppet valves, and the amount of it transferred through the small connecting-rods is lessened because the piston in its motion assists that of the sleeve. However, in reality the piston assists the sleeve motion as much as it counteracts it. In fact, the valve operating mechanism stands the work well. The exhaust sleeve ports become exposed to the explosion chamber heat after the piston has traveled through a part of its downward course, when the temperature is no longer extremely high. To take care of carbon particles capable of working out the sleeve ports, their edges are eased off. The motion of the sleeves adds to a good balancing of the motor.

The general mechanical construction of the Silent Knight motor valve-drive has also been mentioned frequently, particularly the drive from one half-time shaft, with connecting-rods acting at one side of the sleeves, tending to tip them off from the concentric position with the cylinder, which the provided play allows. This objection is important as far as it concerns the bearing surface of sleeves and cylinder, but will not interfere with the good functioning of the motor piston. Moreover, if one prefers an increase in motor complication the sleeves can be driven symmetrically from two half-time shafts placed on opposite motor sides.

The comparative success on the market of the Silent Knight motor has caused other similar constructions to appear. In Fig. 35 a scheme very much like the Knight engine is represented, but having a single eccentric to operate all the same sleeves of the whole cylinder row. This

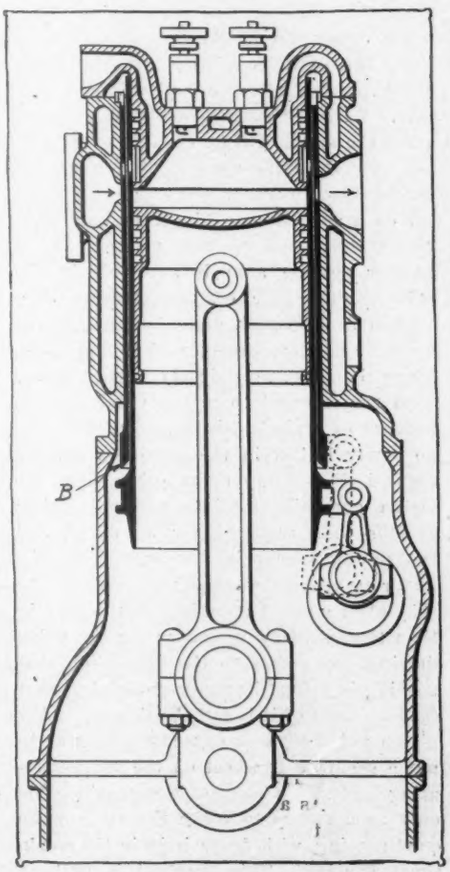


FIG. 34—SECTION KNIGHT MOTOR

eccentric e actuates the sleeves by means of bellcranks a and rods c. Because of the motion coming from an eccentric also, it is easily understood that all things being equal, the valve opening will be precisely of the same character as that of the Knight motor. This construction, Fig. 35, tends to shield the sleeves from the explosion heat, by providing an intermediate water chamber d between the piston p and the sleeves along their whole length. In this construction a number of eccentrics are disposed of, but instead the number of pivot joints is increased, and it is difficult to say which is worse.

Regarding Piston Valves

Passing on now to piston valve systems, let us first consider the one shown in Fig. 36. There are separate piston valves for the inlet and for the exhaust. During the downward motion the upper edge of the valve uncovers a circular opening made in the walls, which opening serves as inlet or exhaust port. The valves are supposed to receive motion from a half-speed shaft, either through eccentrics or cranks with connecting-rods. The diameter of the valves may be assumed to be 2 inches and their total stroke 2 inches. The inlet extends over 105 degrees rotation of the half-speed shaft, and to obtain the greatest possible opening the piston must uncover the port 52 degrees 30 minutes, before reaching its lowest position. The travel of the piston valve previous to reaching this point may be obtained from the equation:

Piston travel $X = 2\,(1 - \cos\,\alpha) \pm l\,(1 - \cos\,\beta)$

The designations being the same as for Fig. 5. A simpler formula of sufficient accuracy for practical use is the following:

$$X = 2\,(1 - \cos\alpha \pm \tfrac{1}{2}\lambda \sin^2\alpha)$$

We may assume that $\lambda = 1/6$, corresponding to $l = 6$ inches. Substituting the actual values and writing the equation in such a manner as to give the piston travel, counting from its lowest position, it is found that:

$X = 1 \times (1 - \cos 52°\ 30' - \tfrac{1}{2} \times 1/6 \sin^2 52°\ 30') = 0.34''$ appr.

If the piston valve has no packing rings, then the port can extend clear around the circumference, and its area will be:

$2 \times \pi \times 0.34 =$ approx. 2.14 square inches.

In case the valve is provided with rings to insure tightness, the port must be provided with bridges to prevent these rings from falling into it, or from sticking at the port edges, and the port area will be greatly reduced. The exhaust port will be a trifle large, having a height of almost 0.4 inch for a period of opening 225 degrees crank motion, but the area still remains smaller than for poppet valves, if the piston has rings. Curve v_r in Fig. 10*a* represents the variation of the opening of valve with a maximum port area of 2.14 square inches, and curve w_r gives the corresponding theoretical intake gas velocity.

It is noted that this gas velocity is almost constant during the first half of the suction stroke, and then gradually drops to the end, it being assumed that the inlet begins together with the downward cylinder piston movement.

Constant Gas Flow Advantageous

A constant gas flow has great advantages. It eliminates speed variations in the intake pipes, causing vibration and inertia losses, and it also conforms well to the gasoline flow through the carbureter nozzle. The effect of inertia on the gasoline flow becomes less noticeable, if the air flows through the carbureter at a more nearly constant rate. In this respect the piston valves are superior to other systems, and with fairly large port openings, they possess real practical advantages. These port openings can easily be increased by increasing the valve stroke. It is also possible, by means of special constructions, to open the port during the movement of the valve away from the half-time shaft. In that case the last member in the parenthesis of the equation for the piston travel will change its sign, and this calculated travel will then be 0.445 inch instead of 0.34 inch, or about 31 per cent greater. Besides, the opening curve v_r of a piston valve giving the same size of opening as a poppet valve, has a more favorable shape, and encloses a bigger area than the curve of the latter. However, mechanically the piston valve can hardly be considered a simplification over the poppet valve. In order that the motor may run without vibration, the piston valves have to be properly balanced, together with their mechanism. The additional bearings of the piston valve mechanism involve increased cost of construction and care in use. It must be considered that the pressure on these bearings is equal to that on the piston valve itself. Special balanced valve constructions can be provided in which the pressure on the valve is equalized.

Self-Driving Feature

Piston valves also allow a variety of arrangements, all more or less similar from a mechanical point of view. The valves can be placed on the sides of the cylinder, on its head, etc. In some piston valve constructions, similar to that of Fig. 36, the exhaust piston is made of greater diameter than the one for the inlet. This exhaust valve piston will be on its downward stroke with the maximum velocity when the explosion occurs in the cylinder. The inlet piston is almost at its dead center at this moment. Such being the case, the exploded gases acting on the exhaust piston will transmit power impulses to the half-time valve shaft, driving it. In this manner the valves become self-driven, and their gearing to the motor crankshaft is merely necessary for maintaining the correct speed and timing, and to carry their excess of power to it. It is being claimed that this results in motor power increase. However, one should consider that the possible increase in motor power is not due to the fact that two pistons, the cylinder piston and the valve piston, move under the explosion gas pressure. With the same quantity of exploded gases the motor will be capable of producing only the same amount of power independently of whether the expanding gases act on a smaller or a bigger moving area, respectively one or two pistons. If a greater moving area is available in the cylinder, the rate of gas pressure drop therein is increased, and consequently the mean cylinder pressure becomes less. There is possible gain in motor power with the referred to piston valve system, because of its self-driving, when for that no power is lost in the gearing from the crankshaft. But, on the other side, the piston generally receives power impulses greater than required for its drive, and the power excess is transmitted to the motor crankshaft through the gearing. As this latter amount of power also is greater than that possibly necessary for the valve driving, one comes to the conclusion that nothing is gained in motor power, but that rather a part of it is lost. With some of the piston valve systems one goes so far as to put a separate flywheel on the valve-operating shaft. This measure is comprehensible only as a means to make the shaft more quiet-running, with fewer jerks in the crankshaft gearing. This flywheel is perhaps necessary for the above reason in case of large-diameter piston valves; for instance, when they are operated in the cylinder head and are as large as the main piston.

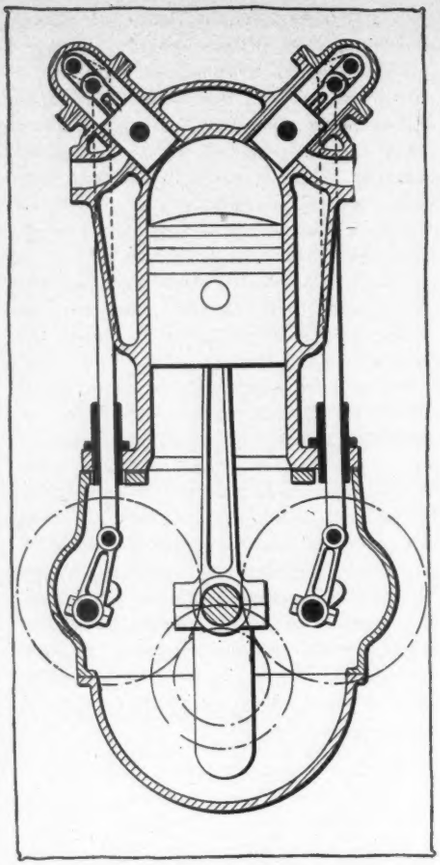


FIG. 37—SPECIAL PISTON VALVE CONSTRUCTION TO RELIEVE VALVE-OPERATING SHAFT FROM FORCES ACTING ON THE PISTON

In Fig. 37 is represented a special piston valve construction, which tends to relieve the valve-operating shaft from heavy forces acting on the pistons. At the moment of explosion the valve pistons in the cylinder head are practically in line with the connecting-rods and the cranks of the upper pivot shafts. Thus the greatest force on the valve pistons is taken up directly by the bearings of the pivot shaft and is not transmitted to the other valve-operating parts. The kind of valve opening obtainable with this system is shown by curve v_s in Fig. 10*a*. This curve was built after graphically laying out the valve motion under certain assumed conditions with a 2-inch stroke of the vertical valve-operating shaft seen in the picture. The valve diameter was left 2 inches. Curve v_s at its start practically conforms with the poppet valve roller-lifter curves and then becomes of a nearly straight-line shape like that of rotary valves. This shape has nothing in it which would justify the great complication of the system, even considering the elimination of great stresses in most parts of the valve-operating mechanism. A combination valve system, Fig. 38, consists of an inner piston valve a, with a port in its side, and of a sleeve valve b, also with a port in its side. The sleeve valve encloses the piston valve, and both are actuated from eccentrics in the usual manner, but with their operating stems being telescoped one inside of the other. In regard to valve motion this system shows the same kind of curves as a double-sleeve valve, the size of opening depending on the chosen dimensions, but being generally small. To get bigger openings, this construction is made in the cylinder head, with the piston valve equal in size to the main cylinder piston. Hereby is lost an advantage of the Fig. 38 arrangement, which has no great stresses acting upon it in the valve mechanism. Over the top of valve a, the intake gases enter the cylinder, and the exhaust occurs through the other port seen in the drawing.

General Observations

All the piston valve systems are more or less complicated mechanically, and are not cheap. Their advantage over the poppet valves lies merely in the silence and positiveness of the valve operation. Both this silence and positiveness are of great advantage to all silent valve systems, when compared with poppet valves. The positive opening and closing of the valve ports generally results in a much more flexible motor and one capable of attaining higher speed. In poppet valves even slight inaccuracy in cams and lifters caused by defective workmanship or wear, results in the valve timing not being the same for all cylinders and not what it was intended to be. This affects the motor

power, its balance and silent running. A poppet valve motor intended to run at high speed will be provided preferably with cams of a somewhat elaborate shape, to insure good cylinder filling by fresh charge. But often this fancy cam shape will become useless, resulting also in an entirely wrong motor timing, if the valve springs should prove to be not strong enough at high speed. The matter is different with silent valve systems. In most of them the ports can be finished accurately to their size in the valve as well as in the cylinder. The timing will be correct and even for all cylinders, and it will start to get out of order only after the parts are considerably worn. The correctly made drives of the silent valve systems also are practically noiseless and remain so as long as the wear in them is taken up. They can be well designed in a manner that almost no place can be found where noise could be generated.

Relative Cost and Weight

As far as general cost of motors with different valve systems is concerned, one can merely guess at present. The rotary valve systems appear to be the cheapest, eliminating a great many parts otherwise found in motors. The piston and sleeve valve systems, on the other hand, are to be considered more expensive than the poppet, because lots of additional work is required with them. The piston valve motors will probably be the heaviest, owing to the solidity of the parts required. Sliding and rotary valves, together with oscillating valves, stand next in regard to motor lightness. They may compete for the place with poppet valve motors. As far as can be seen ahead, the several rotary valve systems, particularly some of them, can be manufactured the most cheaply, can be made of the least weight, and can show motor power equal to any other valve system, besides being of much promising reliability.

Conclusions on Valve Systems

The following conclusions may be drawn from the foregoing discussion:

The quantity of fresh charge drawn into the cylinder during the inlet period depends as much on the character of the valve opening diagram as on the actual maximum size of the opening.

A long period of inlet opening is necessary only insofar as it helps to obtain big inlet ports and better cam shapes. A late inlet closing, up to certain limits, has no great direct influence on the motor power under average conditions, because the additional charge entering during this period is small.

The openings obtained with poppet valves are smaller and their diagrams of openings are also less favorable than with most of the other valve systems mentioned in this article. Poppet valves of large diameter and small lift are preferable to poppet valves with higher lift and small diameter, because with the same maximum size of opening the larger valves, depending on the cam shape, will have a better opening diagram.

Rotary valves driven at constant speed all show the same character of opening diagram, and the one which, besides giving the desired size of openings, permits the simplest and most reliable construction, and is therefore to be preferred.

The Knight valve must be considered superior to the poppet valve, but not superior to some rotary valve constructions.

From the standpoint of efficiency—which latter is favored by a hemispherical explosion chamber—poppet and piston valves located in the cylinder head at an angle are nearest to the ideal. The Silent Knight motor and motors with certain arrangements of cylindrical rotary valves may be considered next best. A good form of explosion chamber is obtained also with the other rotary valve systems with cylindrical or disk valves. Motors with poppet or piston valves located in side pockets have the greatest combustion chamber cooling surface. These constructions also are unfavorable to quick ignition of the charge and must be considered the worst from the standpoint of thermal efficiency.

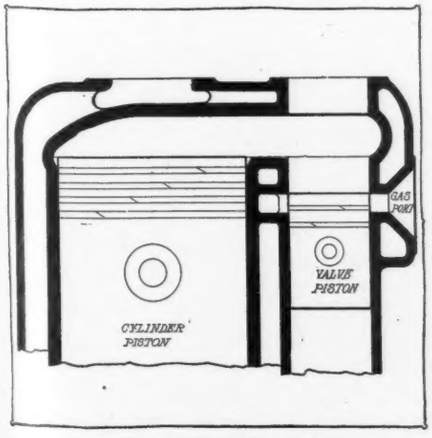


FIG. 36—PISTON VALVE

NEW MARMON MOTORS

Indianapolis, Ind., Sept. 5—For the Vanderbilt cup and the grand prize road races the Marmon people have built two special cars. The first of these new cars was shown at the Indianapolis speedway races which ended Monday. The second has been getting a workout for weeks under the hood of Howard Marmon's touring car. The cars represent the genius and experience of Howard Marmon and Ray Harroun. The new cars have a piston displacement of 413 inches only. Their motors are 4½ by 6½ and are built on exactly the same lines as the smaller Marmon motors. One of the motors is in the chassis which housed the Wasp six. The other is in a short chassis, such as house the small Marmon with its 4½ by 4½ engine. The Marmon crew will leave for the east during the week. Six racing cars will be carried, two being 4½ by 4½, for the Wheatley Hills trophy; two being 4½ by 5 for the Fairmount Park races and the other pair being the big fellows. All are strictly stock cars except the latter pair. One of the big stock machines will go as an added starter in the grand prize race, giving the Marmons three strings to their bow in that event. The Marmon headquarters will be at Krug's hotel, where quarters have been engaged for cars and crew.

EXPORTS AND IMPORTS

Washington, D. C., Sept. 5—The latest government returns made available today show that during July 761 motor cars, valued at $1,034,483, were shipped abroad, as against 470 cars, valued at $874,685, exported during the corresponding month of last year. The exports of parts, not including tires, rose from $87,558 in July a year ago to $189,812 in July last. During the 7 months ended July the number of cars exported increased from 2,780, valued at $4,550,019, in 1909, to 5,311, valued at $7,369,486, in 1910. The exports of parts, not including tires, likewise rose in value from $425,870 to $1,272,058. The shipments of cars and parts during July last were destined as follows: United Kingdom, $309,421; France, $60,038; Germany, $58,420; Italy, $14,296; other European countries, $87,639; Canada, $465,920; Mexico, $64,864; West Indies and Bermuda, $14,153; South America, $33,602; British Oceania, $62,842; other Asia and Oceania, $36,452; other countries, $16,648. Ninety-two motor cars, valued at $191,935, were imported during July. During the same month of last year the number was 144, and the value $300,025. During the 7 months' period the number of cars imported decreased from 864, valued at $1,592,643, in 1909, to 640, valued at $1,264,997, in 1910. The imports of parts, not including tires, declined in value from $86,432, in July, 1909, to $53,438 in July last, but during the 7 months' period rose from $460,998 in 1909 to $548,136 in 1910. The imports of cars during July last were as follows: United Kingdom, 11, valued at $29,097; France, 38, valued at $74,098; Germany, 11, valued at $19,369; Italy, 15, valued at $35,039; other countries, 17, valued at $34,332.

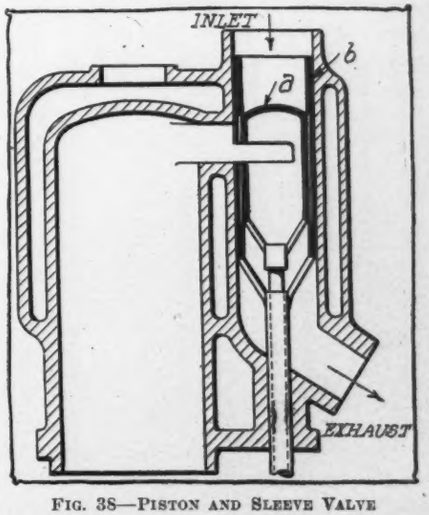
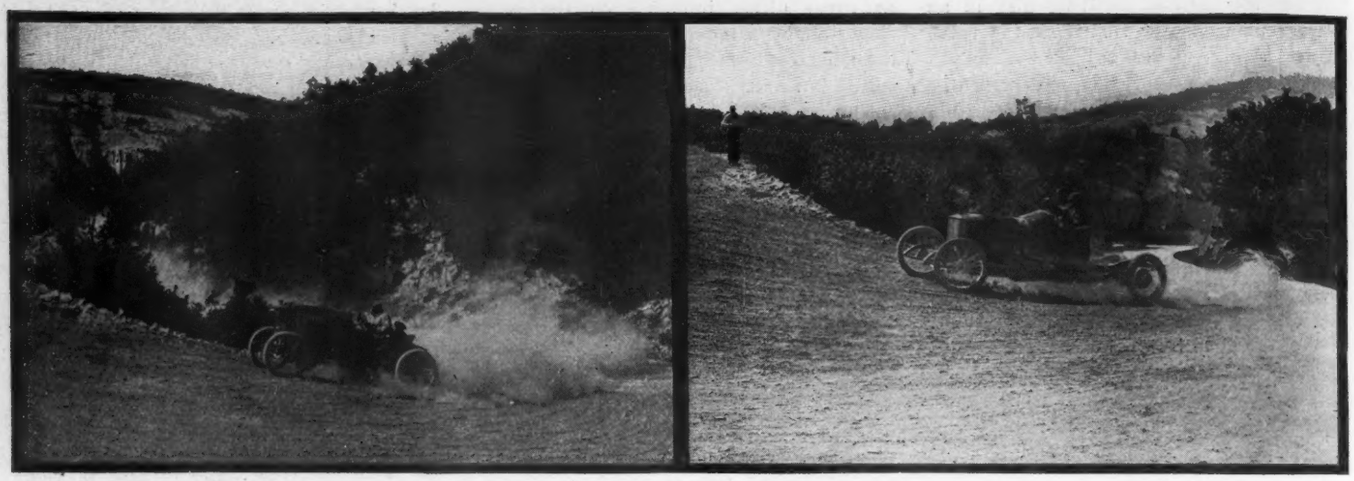


FIG. 38—PISTON AND SLEEVE VALVE

From the Four Winds



MOUNT VENTOUX HILL-CLIMB IN FRANCE—LION-PEUGEOT AND OPEL MAKING 13-MILE CLIMB

COLUMBUS After Members — The Columbus Automobile Club, of Columbus, O., has started out in a fall campaign for members. A special committee on membership has been named and the results of the campaign are expected to be large. While the membership of the club is large, still a large number of motorists in Franklin county have not united with the club.

Good Work in Syracuse—The Automobile Club of Syracuse, N. Y., has put up this season nearly 200 steel enameled route and danger signs in this territory and 100 more have been purchased to be put up soon. Besides the regular route and distance markers, many special signs have been secured to warn tourists of dangerous places and to give information. The club employs a man and team constantly to post the notices. The territory covered stretches to Richfield Springs, 63 miles from Syracuse, and north to Henderson Harbor, about 60 miles away. The territory meets that looked after by the Auburn club on the west and that of Utica on the east. The Syracuse club has also supplied town and village boards with signs to mark steam and trolley railroad crossings.

Run Through Forest Fire—A tour that rivals any made in California in both magnitude and severe conditions has just been completed by G. W. O'Connor, of Modesto, in his Oakland 40 touring car. The most thrilling experience of the tour was a dash of 5 miles through a forest fire, between Hoover and Mineral Springs, in Lassen county. Reports had led the tourists to believe the blaze less serious than circumstances proved it to be, and consequently the dash through was undertaken. They had hardly started before the blaze jumped across the road in their rear, littering it with fallen burning trees and cutting off retreat. Realizing the seriousness of their position, O'Connor covered the gasoline tank with wet burlap as an additional precaution against the flying sparks and continued the run through dense smoke, while flames licked the tree tops overhead and ran riot in the underbrush. Before the danger zone was passed all of the party were nearly blinded by the smoke and their clothing had been burned in several places by the sparks.

Lytle Operated On—Herbert Lytle was forced to undergo a second operation at St. Vincent's hospital in Indianapolis a few days ago, due to injuries he received at the May race meet at the Indianapolis motor speedway. It is expected Lytle will have to remain in the hospital 5 or 6 weeks. He had been expecting to enter in the Labor day races at the speedway.

Massachusetts' Count—According to the last report of the Massachusetts commission up to September 1 there were 638 dealers and makers registered so far this year, an increase of 161 over the same period last year. There were more than 6,000 cars registered for the same period this year over last year, the number now having reached 28,119. The total revenue so far received by the commission has passed $350,000, or more than $200,000 over last year's figures.

Fall Run Scheduled—Arrangements are being perfected for the fall run of the Automobile Club of Philadelphia, which is scheduled to take place on Saturday and Sunday, September 17 and 18. This run will be similar to the spring run of the same club to Lake Hopatcong, N. J., and return. The only definite thing known at present concerning the route is that of the distance—approximately 120 miles on each of the 2 days. It was the original intention to make either Cape May or Wildwood the overnight control and Atlantic City a noonday one on the last leg of the trip. Asbury Park and return was another route under consideration, but it is more than likely that several alterations will take place in these plans, and a new route through South Jersey, with Atlantic City as the overnight control, will probably be selected, returning on Sunday over still another new route. Stops will be made for varying periods at the intervening towns and there will be noon luncheon controls.

Big Road Contract—Another large road contract was let by the commissioners of Lucas county, Ohio, this week, when the agreement was signed awarding the job for the Coon stone road to the France Stone Co. at its bid of $60,960.25. The contract involves 9½ miles of road between Swanton and Holland. It will be macadam, with first course of slag and carbovia binder. The same contractors were also recently awarded the Point Place improvement at its bid of $28,691. Another important road improvement recently awarded in this county was that of the state road in Waterville township, which was let by the state commissioner of highways to the France Stone Co. at $11,499.

Long Run in Moon—Covering 1,400 miles, which is the approximately measured distance by wagon road from St. Louis to Boston, is what the 1911 Moon model 30 accomplished during the past week. The car started from the Moon factory at 8 o'clock Sunday morning, August 28. Phil Wells seated himself at the wheel, accompanied by F. L. Andrews, vice-president of the Moon Car Co., of Boston. At 7 o'clock Sunday evening the car reached Terre Haute, a distance of about 200 miles, over soft and, in some places, miry roads. Leaving Terre Haute at 8 Monday morning, the little car reeled off 215 miles between there and Springfield, O., arriving at the latter place at 6:30 Monday night. From Springfield to Erie, a distance of 304

miles was made in 14½ hours. Wednesday the car went from Erie to Syracuse. Thursday noon it arrived in Albany, having been driven over 100 miles in a blinding rain storm. At 8:30 Friday evening the car pulled into Boston. No mechanical trouble was experienced.

Cincinnati Parade Planned—The motor car flower parade to be given in connection with the Ohio valley industrial exposition, September 14, in Cincinnati, under the auspices of the sons of Osiris, promises to be one of the prettiest events ever held in the central states. Nearly 100 entries have been made and that many more are expected by the time the entries close, September 10. The parade will cover 20 miles over the down-town streets. The prizes, aggregating almost $2,000, will be presented to the winners in silk and leather purses for the best decorated cars or floats.

Energetic Badgers—Not satisfied with arranging a 3-day tour to Sturgeon Bay, Wis., and return for September 3, 4 and 5, members of the Wisconsin State Automobile Association and the Milwaukee Automobile Club are planning a run to Platteville, Wis., on September 23 and 24. It will be a stag pleasure jaunt, but it is expected that about ten cars of Milwaukeeans will make the trip. There will be a meeting of the Southwestern Automobile Association at Platteville on September 23 and the Milwaukee motorists will take in the event. The question of good roads will be discussed and plans will be made for furthering motoring in the southwestern portion of the state.

Cars as Sheep Herders—Out in Paskenta county, California, where the sheep men flourish, the motor car has come into its own and has supplanted that faithful friend of man, the sheep dog. Sheep men are using Jackson cars for driving herds of sheep from Corning to Red Bluff, a distance of 25 miles, in 1 day. Under the old-fashioned way but 10 to 12 miles can be covered. The Paskenta county Jackson owners are now scheming to jerk up the rear wheels and use the motive power of the Jackson to operate sheep-shearing machines. O. C. Mitchell & Sons, of Corning, who were the first sheep men in southern California to try the motor car for driving sheep, say they can double their work each day by its use.

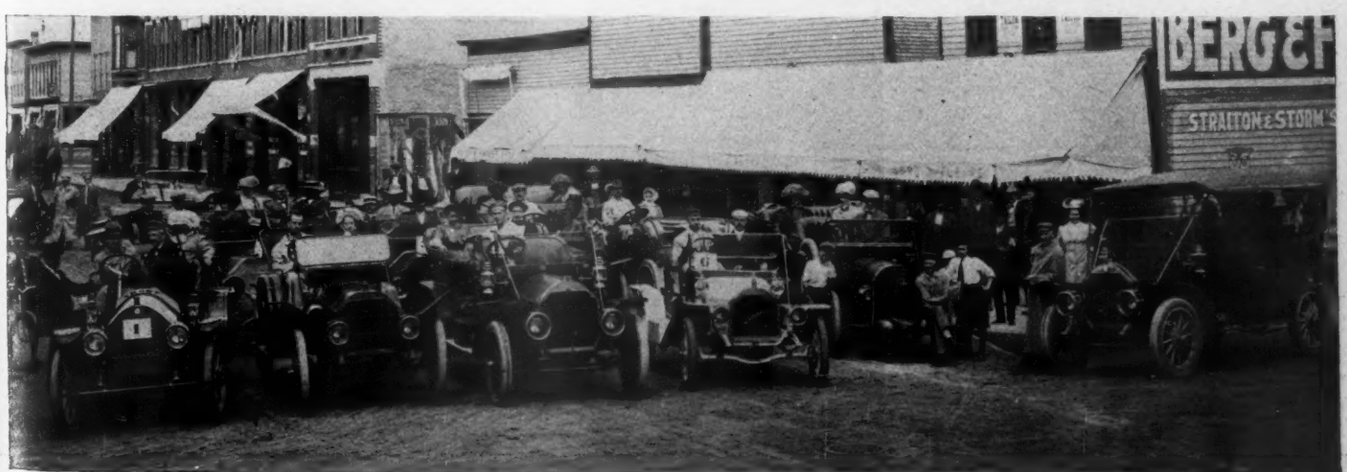
Y. M. C. A. Interested—Interest in motoring in Portland, Ore., is reflected by the decision of the Y. M. C. A. of that city to erect a garage for its motor school. Three thousand dollars has been set aside for that purpose by the directors of the institution. During the past year ninety-four young men have registered in that department of the school.

Run in North Dakota—The first annual tour of the Grand Forks Automobile Club was run from Grand Forks, N. D., consuming 3 days. The entire distance covered 103 miles; Walhalla to Devils Lake, 108 was 322 miles. It was not an endurance run, but one planned and carried out for the purpose of developing public sentiment in favor of good roads and for creating a better spirit of good fellowship among the motorists of the state. The annual tour was conceived by President Wilder. Twelve cars besides the repair car comprised the party, each car carrying from two to four passengers. Each car was driven by its owner, and this feature added much to the interest in the trip. Walhalla, where the first night control was established, had a flag displayed on every building along the street over which the cars passed to the checking-in station. Munich, while not an official stopping point, it being reached in the middle of the afternoon, had a large banner, flanked with flags, flung across the street and inscribed with the words, "Welcome, Grand Forks Automobile Club." At Devils Lake the delegation met the party several miles from the city to extend a welcome. At Devils Lake the Commercial Club kept open house and every courtesy and consideration was extended to the tourists. At Grafton, Langdon and Lakota, where stops were made for dinner, the hospitality was just as enthusiastic as elsewhere. The distance covered on each day follows: Grand Forks to Walhalla, miles; Devils Lake to Grand Forks, 111 miles. The route selected lay, for the greater part, through the broad North Dakota prairies, but for 40 miles it passed through the peculiarly-formed Pembina mountains—elevations that would be termed hills in a mountainous country—and which gave the party some hill-climbing.

Prepare for Belmont Meet—With the issuance of entry blanks for the track races to be conducted under the auspices of the Norristown Automobile Club at Belmont driving park, Narbeth, on the outskirts of Philadelphia, September 24, manufacturers and agents and prominent amateur drivers are sending in their entries and a most interesting track meet is assured, the stellar attraction, of course, being the match race tween Robertson and de Palma.

Keep After Good Roads—The county commissioners of Franklin county, Ohio, will continue its program of highway improvement, even if all the available funds have been exhausted. The plan is to help townships in the county to make repairs to macadam roads and to put dirt roads in good shape. To that end all the machinery owned by the county will be loaned to townships which desire to make road repairs. When the funds were exhausted some eight petitions under the new state highway law were pending before the commissioners.

Oregon Shows Healthy Growth—Preparations are being made for the annual meeting of the Oregon State Automobile Association to be held in Portland September 15. The association is making a healthy growth and now has members living in nearly all parts of Oregon. Several county organizations have been formed recently and are increasing in membership. The county associations are joining in the work of the state organization in spreading the doctrine of good roads. The officers of the Oregon State Automobile Association are: President, J. H. Albert, of Salem; vice-president, W. G. Van Schuyver, of Portland; secretary, Lawrence Therkelsen, of Portland.



GRAND FORKS AUTOMOBILE CLUB ON ITS 3 DAYS' TOUR IN NORTH DAKOTA

MILITARY TEST OF FRENCH MOTOR TRUCKS

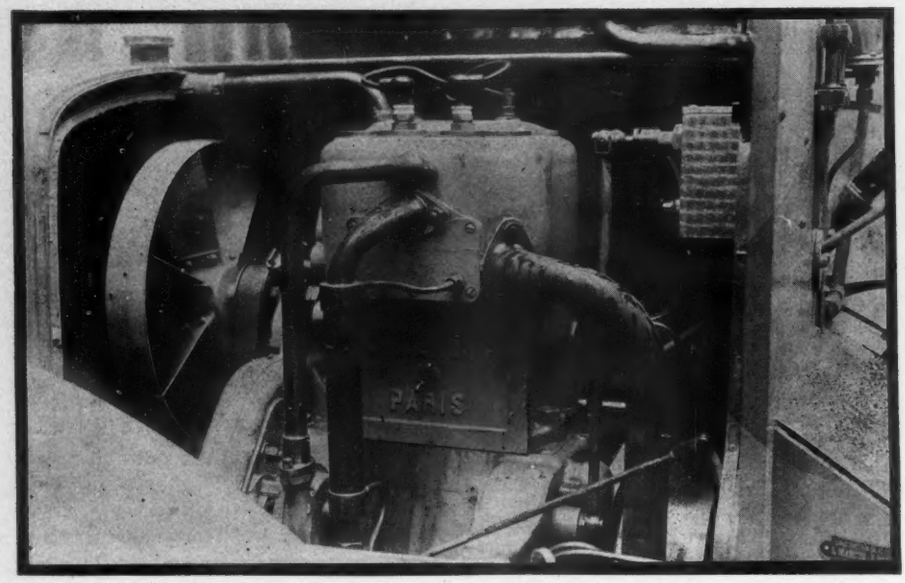


FIG. 1—THE NEW DELAHAYE MOTOR DESIGNED FOR 2-TON TRUCK

PARIS, Aug. 18—Commercial motor manufacturers of France are now engaged in a competition having the advantage of allowing all to be winners. The test is a military one, organized by the Automobile Club of France at the request of the army authorities. The army must have commercial vehicles for its transport service, but instead of buying them outright, it prefers to offer subsidies to private owners of an approved type of vehicle, on the understanding that the owners will present the vehicles for active service when called upon. It is in order to decide which are the most suitable types that the competition is being held.

Thirty-six vehicles, entered by nine different firms, are taking part in the trials. In addition there are two competitors in the bus section. There being no subsidies here and little demand for buses outside the Paris General Omnibus Co., the response has not been hearty. Because of the army requirements the thirty-six trucks entered for the competition show a large amount of similarity. They are in two distinct classes, carrying respectively 2 and 4-ton loads, but in many cases the difference between the two models is slight.

In addition to road capacity the army fixes the size of the wheels, the width of tires, the road clearance, the size of the platform body, the ratio of weight to useful load; also it insists on protection for the driver, accessibility of all organs, protection of the radiator, hooks front and rear for hauling or being hauled, economy in fuel and lubricant, and the use of some device to prevent the vehicle running backwards on a grade. It is because they are bound by these requirements that a certain similarity exists among the vehicles produced in entirely different factories.

Steam and gasoline-electric vehicles, which have figured in some previous French commercial vehicle trials, are entirely absent in the present competition, partly owing to the opposition of the army. Gasoline remains supreme. The tendency is towards small four-cylinder motors for the 2 and 3-ton trucks. Although some of the vehicles entered for this competition are designed to carry a useful load of 4 tons, the biggest motor has a bore of 4 inches, and many of them only measure 3½ inches diameter of cylinder. The ratio of stroke to bore has not increased since last year's competition. In the majority of cases it is 1.3 to 1. One firm, Delahaye, has a ratio of 1.6 to 1, but it is worth noting that last year the same firm had a slightly higher ratio.

Although still in a minority, there is a tendency for French constructors to employ thermo-syphon water circulation for their commercial models. This has been done by Berliet for its 2 and 4-ton trucks, and by Malicet & Blin. The former firm used a gilled-tube radiator with a large header tank back of it, and the latter a special type of radiator composed of rings of plain copper tubes with a fan-driven belt in their center. All other firms stick to pump circulation. The new regulation requiring radiators to be protected from shock has resulted in a stout bar of various shapes being placed across the front. It is an army requirement, but it is also one that has its value for ordinary service.

The great majority of makers prefer to put their motors under the driver's feet. This really is not obligatory, but as the army requirements stipulate a platform of 11 feet 6 inches in length, it is difficult to find room for the motor under a bonnet. While there are plenty of details that could be improved under the heading accessibility, the average standard is high. The motors have profited by the improvements carried out on touring car models, with the result that piping is reduced to a minimum, valve stems are enclosed, electric wires are passed through a tube, the magneto is under a cover, and the underpan can be readily dismounted.

As three distinct fuels have to be employed—gasoline, alcohol and benzol—and as economy forms the basis of classification, considerable attention has been paid to carbureters. In the majority of cases the makers adopt some standard type and modify it according to their own ideas. Warming either by the exhaust or by the circulation water is adopted in every case, while many of the cars, in addition, have supplementary hand controlled additional supply. Only one type of ignition is now employed, namely high-tension magneto, with, for every firm but one, a fixed sparking point. There is not a set of storage

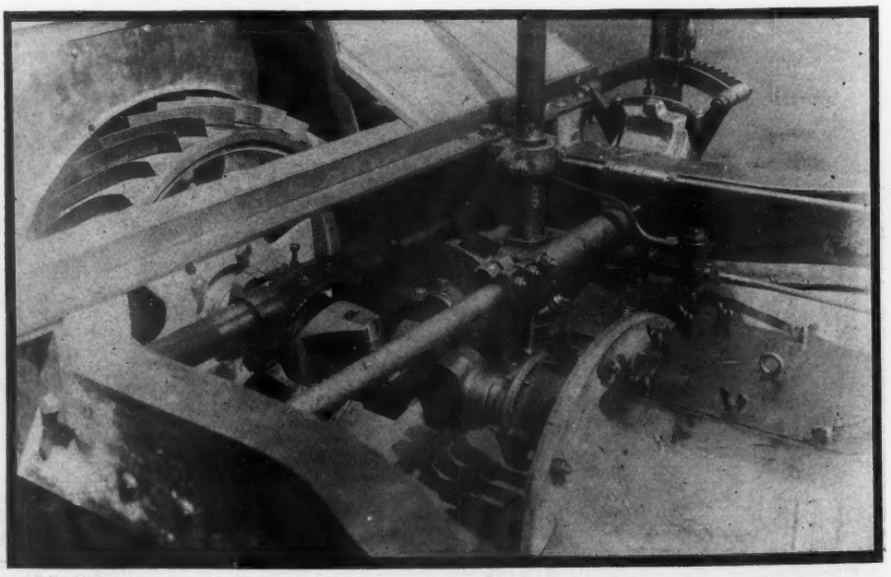


FIG. 2—SHOWING CLUTCH AND GEARSET CONTROL MECHANISM ON VINOT-DEGUINGAND

batteries to be found on the whole thirty-six vehicles. Lubrication, in the majority of cases, is assured by pressure feed to the main bearings, with in some instances the addition of troughs for the lower connecting rod ends.

A preference is shown by the army authorities for steel-shod wheels in place of solid rubber. The majority of manufacturers, however, believe that greatest economy is to be gained by employing solid rubber—single for the front wheels and double for the rear. Only Delahaye and Malicet & Blin have boldly adopted metal for both front and rear wheels of their 3-ton trucks, sticking to rubber for the smaller 2-ton models. Berliet uses rubber for the front wheels and metal for the rear ones, thus making the economy of one pair of tires, and the same is done for the front-drive Latil; as these latter have no mechanism behind the dashboard comparison is not possible. In connection with the steel tires of the Delahaye trucks it is interesting to note that two sets of superimposed springs are employed, the upper set being much lighted than the lower set. When running light the upper leaves carry the weight of the vehicle, and when fully loaded they are depressed until they come in contact with the lower set, the two pairs then working together as one. The arrangement appears to work to advantage, for it is obvious that the same stiffness of springs is not required for an empty platform as for the same platform with a 3 or 4-ton load on it.

Chain drive is employed with only two exceptions: De Dion-Bouton, with transverse cardan shafts, and the front-drive Latil with drive from the transverse motor to a gearbox, and by transverse cardan shafts to the front wheels. A selective type of gearset is employed by all but Panhard, who still adheres to the straight-through type of change with four speeds. One of the distinctive features is to be found on the Vinot-Deguingand 2-ton truck. Here, instead of the gears and differential being in one housing, the gearbox is similar to that used on the firm's largest shaft-driven touring cars, and is mounted just behind the clutch. From this gearbox the drive is taken through the usual type of propellershaft with two universal joints, to a countershaft which is practically identical with the rear axle of a shaft-driven car, except that the extremities of the shafts carry driving pinions instead of the road wheels. The same firm has an omnibus in another section of the competition, with a rear axle providing a double reduction, Fig. 5. The driving pinion P at the extremity of the propellershaft meshes with a bevel P1 on an intermediate shaft, on the center of which is a small spur pinion S in gear with a larger spur gear S1 on the live axle. Among the advantages claimed are that the differential is brought exactly into the center of the rear axle, the two drivingshafts being of exactly equal length.

FIG. 3—DE DION RADIATOR GUARD

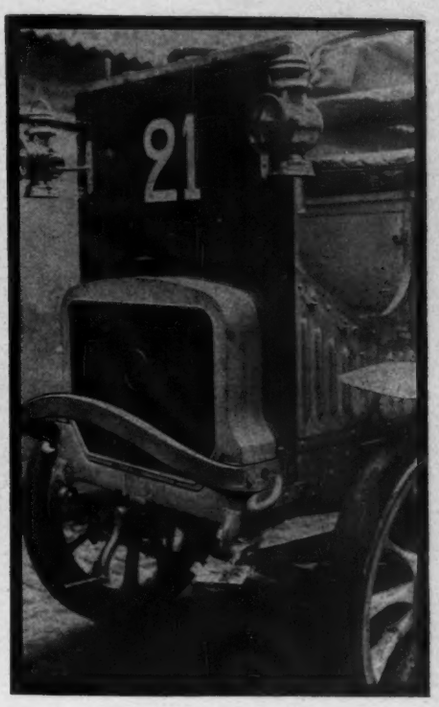


FIG. 4—PANHARD RADIATOR GUARD

As a test the vehicles have to pass 1 month on the road, running singly, in convoys, with and without load, and maintaining an average speed which in no case will exceed 15½ miles an hour. The daily runs will have to be made with gasoline, alcohol and benzol as fuel, the consumption being controlled on certain days and the amount of lubricant noted throughout the competition. The final basis of awards will be made on economy with these three fuels.

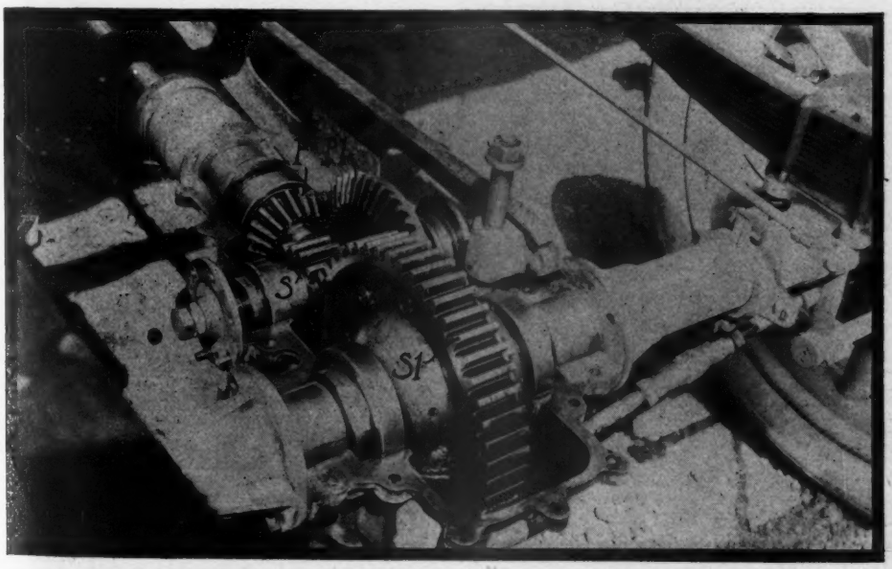


FIG. 5—DOUBLE REDUCTION REAR AXLE ON VINOT-DEGUINGAND LIGHT MOTOR BUS

COMMERCIAL BREVITIES

The latest novelty in motor-propelled vehicles in the vicinity of Portland, Ore., is a farm wagon motor which has been manufactured by C. M. Smith of the famed Webb cherry farm near Portland. The outfit consists of an ordinary farm wagon with a gasoline motor attachment. It will run at a speed of 7 miles an hour, and it is expected that the gear will be changed so that it will run 13 miles an hour. The vehicle was rigged up for the purpose of hauling potatoes to the Portland market. It will carry a load of 2 tons and will make three or four trips while a team of horses is making one.

The Shaw-Bachter Co. of Portland has four large White motor trucks in use. With their use thirty-two 3¼-ton pipes are being delivered every day in two shifts of 2 hours each to the new pipe line at Gresham near Portland.

Boston will have two additional motor chemical wagons if the new fire commissioner, Francis M. Carroll, has his way. He asks for them in his estimate just made up and puts the price at $11,000.

Among the Makers and Dealers

PARKER JOINS OVERLAND—Burton Parker has been appointed advertising manager of Willys-Overland company and will assume his duties at once.

Now Crown Company—The Meiselbach Mfg. Co., manufacturer of commercial cars, South Milwaukee, Wis., has filed an amendment to its articles of incorporation, changing its name to the Crown Commercial Car Co.

Findlay Selected—The Adams Brothers Co., of Findlay, O., has been formed to build commercial trucks and a large plant at that place has been leased by the concern. It is announced that the first model will be completed September 15. L. A. Adams is president of the company.

Peerless House-Warming—The Boston branch of the Peerless company dedicated its new home in the back bay by throwing it open for inspection to all motorists from 8 a. m. to 9 p. m., beginning Tuesday. It is to be kept open for a week, when visitors will be shown throughout the six floors of the new structure, which is a splendid addition to the Boston motor colony, already a large one.

NEW PEERLESS STORE JUST OPENED IN BOSTON

Plans Municipal Garage—A municipal garage will be established in Indianapolis, if an ordinance prepared by Councilman George L. Denny is passed. The ordinance provides for the creation of a municipal garage and of the position of city mechanician. In addition the ordinance states all cars owned by the city shall bear in large letters "City of Indianapolis," and that such cars shall be used only for official business. A penalty is provided for the misuse of cars. The city of Indianapolis owns about one dozen motor cars in its various departments.

Moon in New York—Earl J. Moon, sales manager of the Moon Motor Car Co., has been for the past month and will continue for several months to make his headquarters in New York city, looking after the wholesale selling end of Moon cars in the East. His latest big deal was in closing the Moon Motor Car Co., of Boston, for 250 cars. This concern has been allotted the New England states. A Moon branch has been opened at 2728 Michigan avenue, Chicago, in charge of C. M. Garrett.

THREE-WHEELED WAGENHALS COMMERCIAL CAR MADE IN DETROIT

Chase Company Electron—At the meeting of the stockholders of the Chase Motor Truck Co. the following directors were elected for the ensuing year: A. M. Chase, A. C. Chase, L. O. Bucklin, George A. Brockway, H. P. Bellinger. At a meeting of the directors immediately following the stockholders' meeting the following officers were elected: A. M. Chase, president; H. P. Bellinger, vice-president; E. A. Kingsbury, secretary and treasurer.

Atlanta Changes—There may be some cities of Atlanta's size which have recorded more changes in their motor colonies in the last 2 years than the Georgia capital, but if so they have escaped observation. Here are a few recent ones: The Olds-Oakland Co. has been dissolved and the Olds Motor Works has opened a factory branch in Atlanta. Carter & Logan Brothers, of Savannah, have been given the agency for the Oakland for five states. They will maintain an Atlanta branch, but their headquarters will be located in Savannah. Herman J. Haas has added the Bergdoll to his line. J. K. De Loach is organizing the DeLocal Atlanta Motor Truck Co. He plans to manufacture a low-priced commercial vehicle, equipped with a friction drive. The Georgia Motor Car Co., formerly agent for the E-M-F and Flanders, but now handling the National and the Everitt, has been sold to J. J. and J. L. McLendon, formerly National agents; D. D. McCall, former

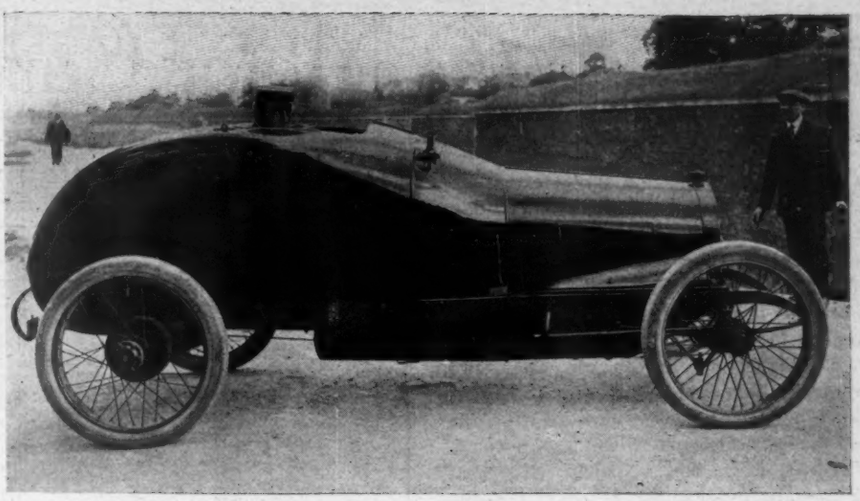
backer of the local Reo agency, and Dr. J. C. Luke. A $40,000 garage and show room will at once be built. The first Atlanta-made Primo was turned out of the factory Thursday.

Bosch Branch Moves—The office and headquarters of the Chicago branch of the Bosch Magneto Co. has removed from 1253 Michigan avenue to 119-121 East Twenty-fourth street, a two-story building midway between Michigan and Indiana avenues.

Splitdorf's Coast Branch—C. F. Splitdorf, manufacturer of ignition specialties, has opened a branch at Los Angeles, Cal., at 1226 South Olive street. A full line of Splitdorf products will be carried in stock for quick delivery. P. M. Graves, who for some years has been with this firm in San Francisco, will have charge of the new branch.

Indianapolis Moves—The Henderson Motor Car Sales Co. is now housed in a new and attractive building at Vermont street and the North Capitol avenue boulevard in Indianapolis. The company is the distributer for the Westcott and Cole. The new building is a one-story brick structure, the street sides being almost solid glass. Just across the street the Moon Motor Car Co., agent for the Davis and Moon cars, has moved into a new two-story brick building.

Teaches Truck-Driving—The Autocar Co., of Ardmore, Pa., has inaugurated an unique school for instructing drivers at its factory, where each purchaser of an Autocar truck may send his driver to secure a complete course in the knowledge of all vital parts of construction and the first rudiments of repairing, shifting of gears, application of brakes and general points on the care and use of the car. T. H. Dwight delivers daily lectures on the cooling and oiling systems, etc. The object is to make assurance that the driver thoroughly understands his car and helps to protect the general public by eliminating the novice from the steering wheel of the commercial truck.



NEW TYPE OF RACING BODY AT BROOKLANDS TRACK, ENGLAND

Now United Motor Branches—A change has been made in the name of the business conducted by the Maxwell-Briscoe Co. Indianapolis Co., at Indianapolis, the company now being known as the United Motor Indianapolis Branch. This is in keeping with the policy of the United Motor Co., which is renaming each of its twenty-eight branch houses throughout the country.

Seitz Branch Manager—F. G. Seitz, until recently assistant sales manager of the Olds Motor Works, of Lansing, Mich., has been appointed by that company as manager of its Philadelphia offices. The newly appointed manager will superintend the wholesale end of the business and his territory will embrace eastern Pennsylvania, southern New Jersey, Maryland, Delaware, Virginia and part of West Virginia. Extensive alterations have been made to the company's building at 231-233 North Broad street.

Penner Succeeds Waite—H. Penner, of Milwaukee, has succeeded J. D. Waite as general manager of the Petrel Motor Car Co., of Milwaukee.

Change of Name—The Bailey Motor Truck Co., of Detroit, Mich., has changed its firm name and will be known in the future as the Federal Motor Truck Co. M. L. Pulcher, who formerly was secretary and purchasing agent of the Oakland Motor Car Co., retains his position as general manager of the company.

Cothran Succeeds Broadwell—The Fisk Rubber Co. announces that Jay B. Cothran has been selected as manager of the New York branch to fill the vacancy left by the resignation of E. H. Broadwell, who becomes vice-president and general manager of the Hudson Motor Car Company. Mr. Cothran has been affiliated with the Diamond and Goodrich companies.

NEW GARAGE OF CADILLAC CO. OF OMAHA

NEW HOME OF THE STANLEY IN OMAHA

The Motor Car Repair Shop

Hints for the Amateur

MANY motorists and junior repairmen are, perhaps, at a loss to know just why an old motor cannot be made to run regularly at slow speed. They have known of motors which when new or after a thorough overhauling have, on an extremely low throttle, run just as regularly as at higher speeds; to use their own words, "she would just barely turn over, and never miss a shot." But after having run a few thousand miles and notwithstanding that the cylinders had been thoroughly overhauled, rebored, perhaps, and new pistons and rings fitted, valves ground, etc., it is impossible to adjust the carbureter so that the motor will not misfire at low speeds; it will hit regularly enough under a load, but when running idle will miss badly. The carbureter generally gets the blame for this when the trouble is really due either to air leaks around the inlet gas-manifold, where it is attached to the cylinders, or to excessively worn valve-guides which have been overlooked in the overhauling.

Overhauling Valve Guides

When it is known that a small sand-hole or the like in the inlet pipe of a motor will spoil the mixture to such an extent that mis-firing is bound to take place at low speeds, it is not hard to imagine how the mixture may be adulterated with too much air admitted through over-large valve-guides. This is a feature which is grossly neglected in many repair shops throughout the country. When the valve-guides of a motor become worn, the remedies are: to fit valves with larger stems, to rebush the guides, or to fit entirely new guides. One way of fitting a new guide into the valve-chamber of a motor is illustrated in Fig. 1; the old worn guide has been removed and a new one is being drawn into place. A long bolt B, extending through the guide H, and up through the spark-plug hole in the valve-cap, has a nut N at its upper end which when drawn down serves to draw the guide into place. The taper of the guide-hole in the valve chamber is greatly exaggerated in this sketch, the taper in reality being very slight and the guide a force fit. In Fig. 2 a method is illustrated of rebushing a valve-guide. The hole in the guide has been bored out so that the bushing B, which is made from seamless steel tubing about 1/16 inch thick, can be fitted into place. The inside of the bushing is reamed out so as to be an easy running fit on the valve-stem, and the outside diameter is such that the bushing will be a snug or easy driving fit in the guide. Having made the bushing it is best drawn into place as at D; a long bolt is slipped through the bushing as illustrated, a plate or bar with a hole in it placed across the valve-cap opening on the top of the cylinder, the end of the bolt passed through the hole, and the nut slowly turned to draw the bushing into place. This method is better than hammering the bush into place because it is easier and less liable to damage it.

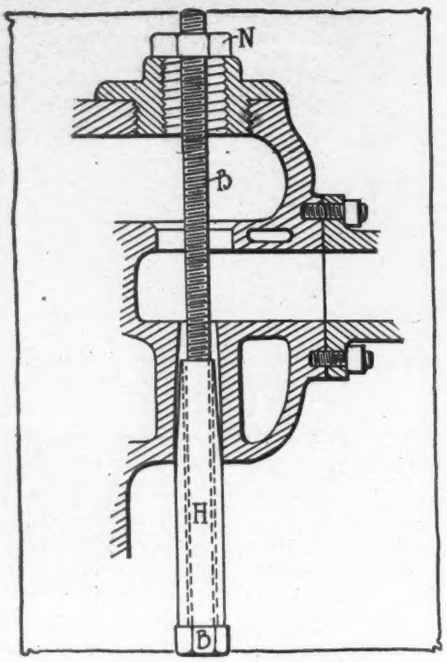


FIG. 1—REFITTING VALVE GUIDE

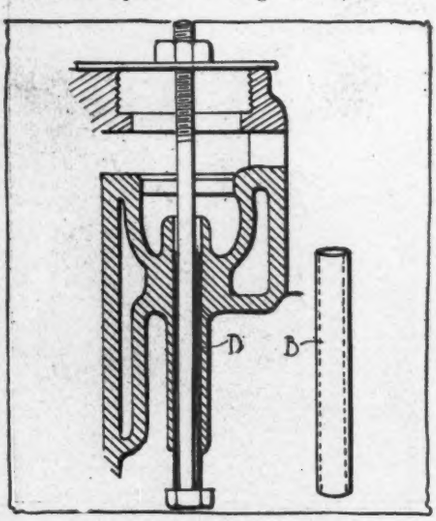


FIG. 2—REBUSHING VALVE GUIDE

When the bushing is in place, it is customary to secure it by drilling a hole through the side of the guide, say at about the point D, Fig. 2, making just the point of the drill enter the bushing, the hole is then tapped and a little set-screw with a point similar to that of the drill is screwed into place. The set-screw itself may be secured by a couple of prick-punch holes. The set-screw should not be cut off close to the guide and then filed flush, as is the practice of some repairmen, for it may require removal at some future time, in which case much unnecessary labor may be saved if the set screw is readily found and removable. The bolt arrangement shown in Figs. 1 and 2 can also be very conveniently employed in removing some types of removable valve-guides, as shown in Fig. 3. This is a sketch of the type of guide used on Pierce-Arrow motors. To remove guides of this character, it is but necessary to first remove the nut N, and start the guide G, by simply turning down on the nut T, the usual washer or plate W being used in this case to protect the end of the valve-cap retainer which is screwed into place. Having loosened the guide, it remains but to remove the valve-cap retainer, take out the guide, replace it with a new or unworn one, replace the nut N and draw it up tightly.

Starting on the Spark

A short time ago the writer happened to be riding about a large city in a motor car driven by an expert. The motor, evidently, was adapted to being started on the spark, for the driver made no attempt to crank it, but just turned the switch to the battery side and worked the spark lever down and up a couple of times, but nothing stirred. Non-pulsed, however, said driver simply reached forward, gave the coil box a thump with his fist, and up started the motor. Had he said, "Shange! Presto! Koholorum! Alahmarch!" it might have been taken for magic, but the facts in the case were that the contacts of a trembler were simply in need of a dressing-down and had stuck together in a characteristic manner.

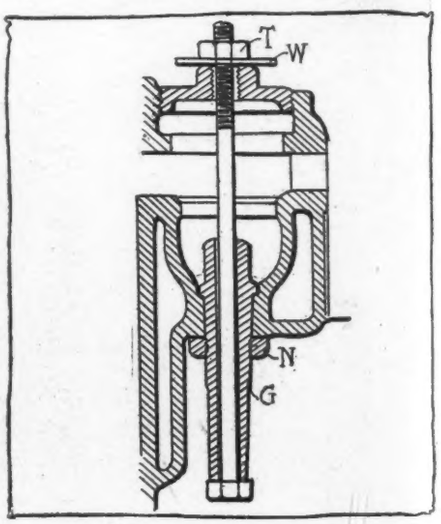


FIG. 3—PIERCE-ARROW VALVE GUIDE

Current Motor Car Patents

Motor Car Radiator—No. 967,248, dated August 16; to Adam Schepper and Edward Covert, Bay City, Mich.—This patent relates to a type of radiator tube construction, which, as illustrated in Fig. 1, is a combination of a plurality of four-sided tubes, rectangular in general contour, with each side of each tube depressed inwardly to form an inwardly projecting groove. The tubes, when assembled, are arranged with their flat sides parallel and spaced apart, the grooves of each of the tubes lying opposite the grooves of the adjacent tubes. The advantage of this construction lies in the increased radiating surface obtained without an increase in the size of the radiator as a whole.

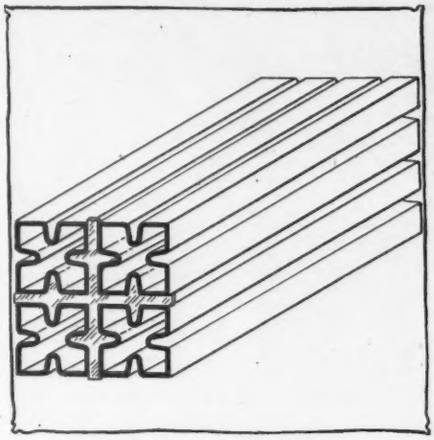


FIG 1—NEW RADIATOR DESIGN

Anti-skidding Device—No. 967,808, dated August 16; to Robert A. Moore, Chicago, Ill.—The anti-skidding device to which this patent relates is unlike the usual devices of this nature that attach to the wheels or tires of a vehicle. It is more on the order of a sprag and may claim among its advantages an adaptability to be used as such. It consists of a pair of parallel legs L, one opposite each rear wheel, Fig. 4, pivotally connected to clamps C on the rear axle of a motor car, with means for normally holding the feet F off the ground, and a foot operated means to draw the legs down and forwardly into engagement with the ground. The feet F have runners on their under portions, which are designed to resist skidding and direct a skidding vehicle back toward its proper path.

Lamps That Turn With Wheels—Nos. 967,620 and 967,621, dated August 16; to Peter B. Donahoo, Oakland, Cal.—These patents relate to a means of pivoting the headlights of a motor car and arranging communication between them and a steering-knuckle, so that they will turn as the wheels turn, and thereby be of service in turning corners or rounding curves. Patent No. 967,620 covers the device illustrated in Fig. 3, which comprises a lamp bracket B attached to the frame of the car, an arm A mounted thereon, a lamp support S having a base mounted upon a ring in the end of the arm A with a pin end to this pin of the lamp support, and

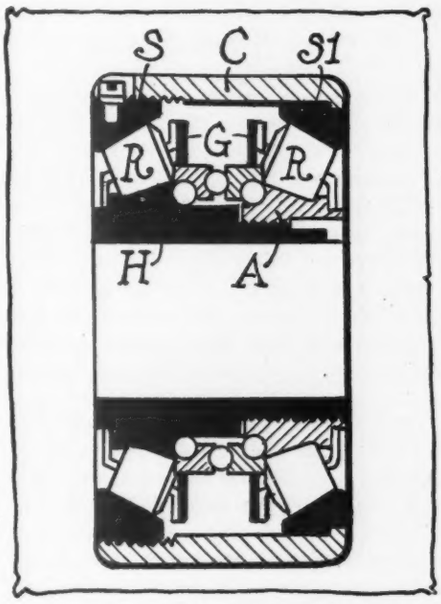


FIG. 2—COMBINATION ROLLER BEARING

projecting through the ring, a flexible shaft T having one end connected to the turning gear of the vehicle and other a rod connecting arms on the lamp-supporting brackets S to move the lamps in like directions. The other patent relates to the device shown in Fig. 5. The only difference between this device and the one shown in Fig. 3 is that an endless cable C is used as a means of communication between the end of the lamp support and the steering-knuckle instead of a flexible shaft. The endless cable in this case operates between a spool O on the end of the lamp support and another spool L on the upper end of the steering-knuckle pin. Anti-friction bearings are provided for the lamp brackets.

Combination Roller Bearing—No. 958,963, dated May 24; to Charles S. Lockwood, Newark, N. J.—This patent covers an adjustable type of combination roller and ball bearing arranged as illustrated in Fig. 2. The hub, H, has a conical seat upon one end and a threaded boss on the opposite end; and a threaded collar, A, is fitted to this boss which is provided with an oppositely inclined conical seat. The boss and collar have a series of keyways and a key is fitted for locking the parts when adjusted. Two series of conical rolls, R, are fitted between the conical seats on the hub and on the seats, S and S1, of the casing,C. The basis of the conical seats of the hub have opposed ball races, with a series of balls fitted thereto; and through rings fitted movably to the inner end of the rolls are provided with co-operating ball races. Means for supporting the adjacent ends of the rings upon one another to resist end thrust are also provided.

Demountable Rim—No. 967,536, dated Aug. 16; to Andre Michelin, Paris, Fr.—This patent covers a demountable rim secured by a series of transverse bolts through the felloe. On the end of each bolt fits a wedge piece which enters between the felloe and the rim. The transverse felloe bolts are not straight from end to end but incline towards the hub when two-thirds way through the felloe, the apparent object being to facilitate entering the wedge between the felloe and the rim.

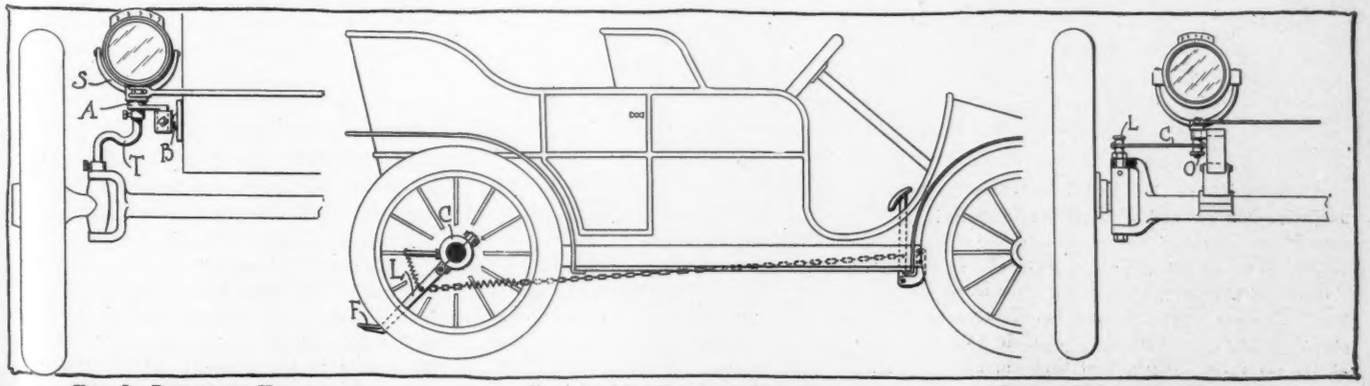
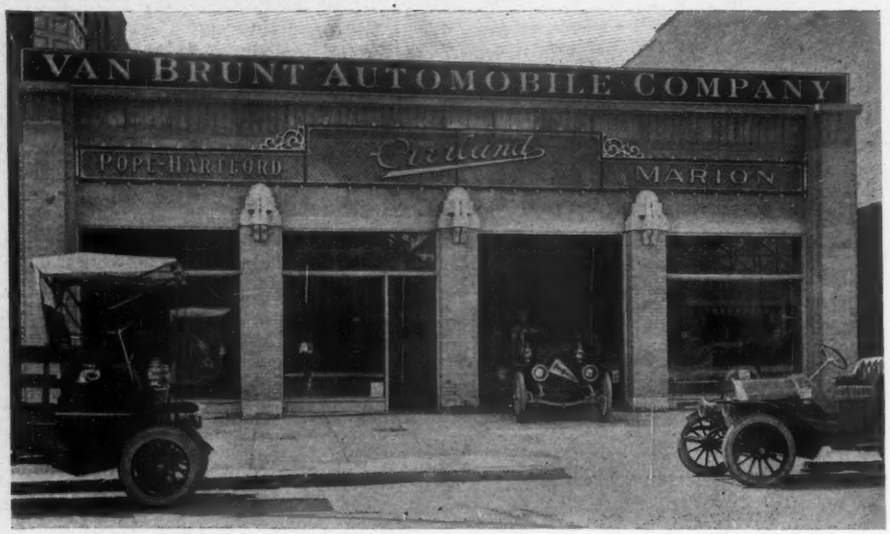


FIG. 3—REVOLVING HEADLIGHT FIG. 4—ANTI-SKIDDING DEVICE FIG. 5—REVOLVING HEAD-LIGHT

Brief Business Announcements



NEW GARAGE OF THE VAN BRUNT AUTOMOBILE CO. OF OMAHA

PASO ROBLES, CAL.—Ground was broken for a new garage on the corner of Spring and Thirteenth streets.

Indianapolis, Ind.—J. I. Holcomb, of the Willis-Holcomb Co., has filed in the circuit court a petition to change the name of the corporation to the Holcomb Motor Car Co.

Bloomington, Ill.—W. T. Webb will soon begin the construction of a garage, a two-story building 57 feet on East Madison street. The building will be constructed of brick or concrete.

Seattle, Wash.—The Murray Motor Car Co. has entered the Seattle field and is located at 1716-18 Broadway. This company has taken on the Hudson car and the Grabowsky power wagon.

San Jacinto, Cal.—The San Jacinto garage has been sold to M. L. Baisley. The garage is one of the best equipped in southern California and originally was started by W. D. Jacobs.

Portland, Ore.—Edward E. Gerlinger has taken the agency in Portland for the Stoddard-Dayton. The agency will cover the state of Oregon and will be known as the Stoddard-Dayton Automobile Co.

Philadelphia, Pa.—The Fanning Motor Co., Philadelphia distributer of the Thomas, has secured new and more attractive quarters in the Scottish Rite building, southwest corner of Broad and Race streets.

Atlanta, Ga.—The Regal company, of Detroit, has opened a southern branch in Atlanta under the name of the Southern Regal Auto Co. of Georgia. This company will have Virginia, North and South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Arkansas and Tennessee as its territory. With one possible exception, this is the largest territory controlled from Atlanta by any company. The company will have a garage and show rooms at 380 Peachtree street.

Cleveland, O.—J. B. Sperry, Cleveland agent for the Henry line, moved into his new salesrooms in the row September 1.

Philadelphia, Pa.—Edwin Swartley, Philadelphia manager for the Klinekar, has resigned and in the future will be identified with the real estate business.

Los Angeles, Cal.—Plans for erecting a new garage by the Maxwell-Briscoe Los Angeles Co. have been completed. The building will be two stories and a basement.

Philadelphia, Pa.—John H. McFadden has sold to George C. Boldt the two-story garage at 1408 Chancellor street. The property is in the rear of 1401 Locust street.

Cincinnati, O.—The Star Rubber Co., of Akron, O., manufacturer of motor car tires, has established an agency in Cincinnati with the Auto Tire and Repair Co. at 907 Race street.

Los Angeles, Cal.—A public garage, 46 by 100 feet, will be erected on South Main street, near Thirty-sixth place, by Frank E. Moore. It will have a front of pressed brick and plate glass windows.

Cincinnati, O.—The Robert C. Crowthers Automobile Co. has moved into the fine new fireproof building at 111 East Seventh street, where it will have a display room for the Elmore.

Philadelphia, Pa.—One of the latest additions to the row offerings in the line of pleasure cars is the Owen, the Philadelphia agency of which has been secured by E. R. Jackson and W. H. Walter, under the firm name of the Jackson-Walter Co. The company is temporarily transacting business from the Bellevue-Stratford garage, pending the securing of suitable quarters on North Broad street.

Cleveland, O.—The Fisk Rubber Co., of Cleveland, has removed to its new building at 2931 Euclid avenue. R. J. Youngblood has been made assistant manager.

Stockton, Cal.—The Studebaker company, which has a branch in Stockton, will begin the erection of a repository and wareroom building to cost $100,000. It will be on Main street.

Portland, Ore.—Neate & McCarthy have completed at Washington and King streets one of the finest garages in that city. The garage has a ground plan of 55 by 100 feet and the structure is one story in height with skylights. There is not a post on the entire floor.

Philadelphia, Pa.—Two large garages are in course of erection on Market street, one at the northeast corner of Twenty-first street and Market street for the Auto Car Co., and the other at the northeast corner of Twenty-third and Market streets for the Bartlett company.

Jackson, Tenn.—A charter was granted by Secretary of State Hallum W. Goodloe to the Jackson Garage Co. of Jackson, with a capital stock of $10,000. The following were named as incorporators: Charles E. Dexter, F. M. Spiller, Mark Glen, J. A. Pope, S. M. Spilles.

Columbus, O.—The Cummings Auto Sales Co., organized recently with an authorized capital of $20,000, has taken the sales rooms at 153 North Fourth street, formerly occupied by the Burdell Auto Sales Co. The company will have the central Ohio agency for the Elmore.

Columbus, O.—The Cummings Auto Sales Co. has been incorporated with a capital of $10,000 to operate a sales agency and garage in Columbus. The incorporators are Charles C. Cummings, Frank S. Cummings, Mary Z. Cummings, Iva E. Cummings and Virgil L. Fishbaugh.

Columbus, O.—The Hudson Sales Co., of Columbus, of which Levi R. Smith is manager, has been organized to take the 1911 agency for the Hudson in central Ohio. The concern has located at 241 North Fourth street and consists of a partnership of Levi R. Smith and William Gaither.

Cleveland, O.—John Rauch, Hupmobile agent of Cleveland, has formed the Hupp Motor Sales Co. to handle the Hupmobile in Cleveland and surrounding territory. F. Love is the president, A. H. Homan treasurer and John Rauch secretary and general manager. Temporary salesrooms will be established at 1206 Huron road. After November 1 the company will be located at 1027 Chestnut avenue, where a new

building that will cover 6,600 square feet of space is in course of construction for the new company.

Seattle, Wash.—F. A. Mitchell, has purchased the garage of the White Motor Co. on Broadway. He intends to reorganize the White garage.

Cleveland, O.—The Broc Electric Vehicle Co. has moved into its new salesrooms at Euclid avenue and East Twenty-first street.

Columbus, O.—At Washington enterprising citizens have subscribed $50,000 of $75,000 necessary to secure the Pilot Automobile Co. for that place.

Cleveland, O.—C. C. Hammerlee, of Cleveland, who has been Goodyear manager for northern Ohio, has had the entire state added to his territory.

Cincinnati, O.—The Enger Motor Car Co., manufacturer of the Enger, has closed contracts with the Federal Motor Car Co. of Chicago for 200 cars for 1911.

Cincinnati, O.—The Charles Behlen Sons' Co. has made arrangements with the Anderson Carriage Co. of Detroit for the local representation and sale there of the Detroit electric.

Boston, Mass.—The American Automobile Co. of Boston has secured William P. Barnhart as its manager. He had been manager of one of the big taxicab companies for a couple of years.

Philadelphia, Pa.—The Petrel, a product of Milwaukee and a newcomer to the Philadelphia field, will be represented here by Reamer & Haines, 2214 Spring Garden street, which firm now handles the Baker electric.

Boston, Mass.—A new company headed by L. H. Wetherell has been organized in Boston to handle the entire wholesale and retail business of the Croxton-Keeton car in New England. It is known as the Croxton Motor Car Co. of Boston.

Boston, Mass.—President H. O. Smith, of the Premier company, has rewarded Henry L. Johnson, who has so successfully managed the Boston branch for the past few years, with an important factory position.

Detroit, Mich.—L. N. Beaker has been awarded the contract for constructing a plant in Wyandotte for the Seitz Motor Co., and work will be started within a few days. It is thought the new plant will be in running order by December 1.

Chillicothe, O.—The Scioto Auto Co., organized recently with an authorized capital of $150,000, of which $85,000 has been subscribed, will take over the plant of the Arbenz Furniture Co. at Chillicothe and will remodel it into a motor car plant.

Toledo, O.—The McLeary Engineering Co. has been incorporated at Toledo by Edward McLeary, Oliver P. Barnhart, Reuben Y. Barnhart, Samuel J. Logan and John F. Kumler, Jr. It has an authorized capital stock of $25,000, and will take over and expand the business of Ed McLeary, who for years has conducted a machine shop. Engines will be added to the output of the concern.

Recent Incorporations

Trenton, N. J.—Safety Tire Gauge Co., capital stock $100,000; to manufacture air garages; incorporator, F. H. Drury.

Albany, N. Y.—Morgan & Wright, capital stock $10,000; to manufacture rubber goods; incorporator, J. J. Alexander.

Newark, N. J.—New Jersey Overland Co., capital stock $100,000; to manufacture motor cars; incorporators, William F. Acker, Harry Heinsheimer and Roland D. Crocker.

Jersey City, N. J.—Pope Motor Car Co., capital stock $125,000; to manufacture motor cars; incorporators, Frank Koch, Willard C. Fisk and Clinton E. Fisk.

Boston, Mass.—E. R. Parker Co., capital stock $125,000; to manufacture motor cars; incorporators, Frank Koch, Willard C. Fisk and Clinton E. Fisk.

Boston, Mass.—Hodges Garage Co., capital stock $20,000; to manufacture motor cars and vehicles; incorporator, Henry B. Hodges.

Boston, Mass.—Boston Garage Co., capital stock $50,000; incorporators, Paul M. Hubbard and J. Duke Smith.

Buffalo, N. Y.—International Automobile League Tire and Rubber Co., capital stock $1,000; to manufacture motor cars and rubber; incorporators, Alfred C. Bidewell, Wm. Preiss and Chas. H. Bowe.

Utica, N. Y.—James S. Johnston Mfg. Co., capital stock $100,000; to manufacture machinery; incorporator, Chas. A. Powell.

Chicago—Peerless Motor Car Co., capital stock $60,000; to manufacture motor cars and accessories; incorporators, Louis E. Hart, Japerson Smith and Dunne T. McNabb.

Chicago—National Radio Light Co., capital stock $25,000; to do general manufacturing; incorporators, Wm. A. McGivern, John F. Clare and Edward Hyrnes.

Chicago—Manufacturers Auto Tire Co., capital stock $2,500; to manufacture motor car parts; incorporators, Wm. T. Wilson, Frederick J. Larson and Bert B. Baker.

Chicago—Welch Machinery Mfg. Co., capital stock $5,000; to manufacture machinery; incorporators, L. W. McGivern, John C. Fry and G. Raymond Collins.

Cleveland, O.—F. E. McClure will open a branch house shortly in Cleveland for the Brush runabout. He will locate on Euclid avenue.

Cleveland, O.—The Ohio Regal Automobile Co., which has taken the Regal branch for 1911, opened its salesrooms September 1 at 1924 Euclid avenue. F. L. Pierce is manager.

Boston, Mass.—The Moon again is represented in Boston after a lapse of 2 years, this time by the Linscott Motor Co. It was taken on to fill the place of the Overland. The first 1911 Moon was driven over the road by C. G. Andrews from St. Louis. He will look after the Moon end of the business, as the Linscott company also has the Reo.

Trenton, N. J.—Norman P. Druck, who will be in charge of the Stoddard-Dayton here, is having a garage and show room remodeled and placed in condition at 237 North Broad street. Mr. Druck expects to have the new place ready for occupancy about October 1.

Boston, Mass.—William F. Adams has been appointed manager of the Grout branch in Boston and Allie McKenna has been made assistant manager. They have both been with the Grout company for several years.

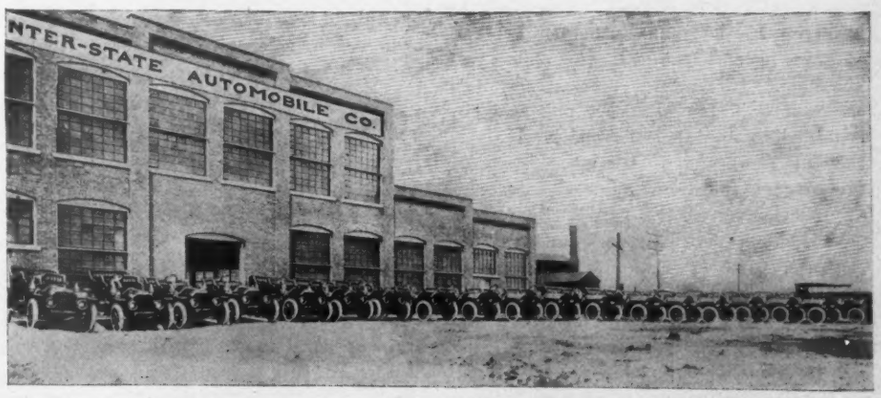
Syracuse, N. Y.—In addition to the garage which the Onondaga Taxicab Co. will maintain in the rear of 328 and 332 South Warren streets, near the new Onondaga hotel, the company is having plans prepared for a large garage to be erected at 206 East Onondaga street.

Warren, Pa.—The Warren Iron and Specialty Mfg. Co. has bought the plant of R. J. Schlosser on East Pennsylvania avenue, Warren, and is arranging to fit it up for the manufacture of parts. The building when completed will have 60,000 feet of floor space and 40 men will be employed.

Philadelphia, Pa.—Work will be commenced soon by James G. Doak & Co. on the erection of a four-story brick garage at the northwest corner of Twenty-first street and Market street, for the Bartlett Garage Co., to cost $100,000. The building will have a frontage of 221 and a depth of 110 feet.

Minneapolis, Minn.—Another addition to the motor ranks of this city is the new garage of the Electric Carriage and Battery Co., at 1207 Harmon place. This building has resulted from the steadily increasing business realized by the concern on electrics and will be used both as a salesroom and for storage.

Warren, O.—The Hitchcock Motor Co. has been organized. M. H. Hood, of West Farmington, Ohio, has bought the interest of J. H. Hitchcock and will be the president of the company. E. W. Skinner, for the past 3 years manager of the Bangora Slate Co. at Columbus, has bought the interest of R. H. Crehan.



INTER-STATE BULLDOGS ABOUT TO BE SHIPPED FROM FACTORY TO BOSTON

Manufacturers' Communications

OVERLAND NOT RACING

INDIANAPOLIS, Ind.—Editor Motor Age—Persistent inquiries come to our company asking why we do not as a factory enter our cars in races. The reasons are: First, it is too dangerous. We think more of the life of an employe than we do of the most valuable trophy on earth. Second, we do not need this kind of advertising. Racing for many concerns is a matter of publicity. I think it is not the kind that pays. For an unknown car that wants to become known at a bound it may be a good means. Third, we test our cars in other ways just as severe. I believe in factory and road tests for every car alike, instead of a hard race for one or two special cars. Fourth, we do not build cars with excessive power or speed. I think the public doesn't want such a car for rational everyday service. Then, too, there is such a chance in the racing game. I have seen a splendid car win wonderful races time and again, and then one day, because of some minor trouble, lose out to an inferior machine. All of the former glory of this machine was shadowed by this one defeat. Of course we cannot keep any ambitious private owner from entering an Overland in a race, but even this does not meet with favor, because no matter how good a car is the driver must have long experience and there must be a well established racing camp. We have not been in the game enough to take care of the drivers in races, therefore we do not help anyone who wants to race an Overland. I do not urge others to stay out of the racing game. It is a matter of individual opinion. But as for us, we lean toward building cars on a commercial basis for everyday service.—W. H. Brown, Willys-Overland Co.

MIXING KEROSENE AND OIL

Rochester, N. Y.—Editor Motor Age—Referring to the influence of kerosene on lubricating oil, it is enough to say that oil is ruined for the purpose of lubricating if it is thus diluted. Proof of this is given in the plan by which kerosene is used in clutch oil, if the clutch will not hold. In a word, lubricating oil in the clutch is too slippery, and kerosene is added to diminish the unctuousness on the one hand and a still more important property on the other, namely, the ability of lubricating oil to persist in remaining between two surfaces under great pressure. In the case of the clutch it is desired to have the oil squeeze out from the disks with ease. This ease would be ruinous to a crankshaft bearing. But this is not even half told; the flash point of the lubricating oil is of the greatest importance, and this point will be much altered if the oil is tinkered with. The flash point of kerosene is low in comparison with the same point of lubricating oil. Constantly feeding kerosene to the cylinders of a motor, even if the same is sneaked in with the lubricating oil, is bound to result in the unbalancing of the explosive mixture, and it is plain that the question of carbon deposit will be rendered all the more prominent.

Legal Lights and Side Lights

A STATEMENT made by the general sales manager of a corporation defendand that a motor car made by it and sold to plaintiff would not develop the horsepower represented to plaintiff when the sale was made, by 30 per cent, as an admission by defendant, was competent but not conclusive of the fact stated. In an action by the purchaser of a car to recover the purchase price paid, on an attempted recission of the contract because of misrepresentation inducing the sale, the question whether the machine would develop the horsepower represented, is one of fact for the jury, notwithstanding the testimony of experts as to the theoretical horsepower which would be developed by an engine of the dimensions of that sold. This came up in Joslyn vs. Cadillac Automobile Co., 177 Fed. 863.

AS TO SPEED OF CAR

Person injured on a street crossing by a motor car, who sees it approaching him at a distance of 10 or 15 feet, and who has frequently observed the passage of motor car and other vehicles, and ridden in them, and made observations of their rate of speed, may give his opinion of the speed of the car at the time of the collision, says the court in Himmlwright vs. Baker, 109 Pac., Kan., 178.

NOT EVIDENCE OF NEGLIGENCE

It was held in a New York supreme court case a short time ago that "negligence on the part of receivers operating a street railroad cannot be inferred from the mere fact that a street car came into collision with a motor car. This decision was given in a case where the evidence, while showing that the accident happened, failed to show that the collision was caused by, or due to, negligence on the part of the receiver's servant, and was rendered in Moore vs. Joline, 123 N. Y. Sup. 117.

LIABLE FOR NEGLIGENT INJURY

A bailee receiving a crankshaft to test and straighten is not liable for injuring the same while attempting to straighten it, unless he fails to employ ordinary care and skill required in such work, says the court in P. H. Gill & Sons vs. Detroit-Cadillac M. C. Co., 123 N. Y. Sup. 621, which was recently decided.

An easy and simple test for lubricating oil is as follows: Place the oil to be tested in a small porcelain or glass cup filled with sand and set it in a metal dish, so that the surface of the oil in the cup is about level with the surface of the sand in the dish. The receptacle containing the oil should be covered, the cover having two perforations ¼ inch in diameter. One of these holes is for the introduction of the thermometer and the other to provide an exit of the vapors given off. The bulb of the thermometer must be clear of the bottom of the cup by at least ⅜ inch. Heat the metal dish by means of a Bunsen or gas flame, noting the rise in temperature of the oil by means of the thermometer. After the oil reaches a somewhat critical temperature, which can be determined by a preliminary test, pass a lighted taper over the open hole in the cover, carefully noting the thermometer reading at the instant at which a flash is observed. The temperature so noted checked for accuracy by one or more repetitions of the run, is the flash point of the oil.—Frank B. Killian, Vacuum Oil Co.

NEW HUDSON IDEA

Detroit, Mich.—Editor Motor Age—The Hudson Motor Car Co. has established a new kind of service department further to assist dealers in taking care of customers. The latest Hudson innovation is expected to solve the greatest question in motor car merchandising. It aims to advance and uplift the cause of the motor car generally; to make buyers the best advertisers of the cars of their choice and to make motorists students of the gasoline engine that it may be put to performing other services besides transporting passengers.

The Hudson service department aims to put a stop to the habit of dealers losing their interest in customers after they buy a car. That is one thing the Hudson company never has allowed its agents to do, but it has been done by others and has hurt the whole trade. If dealers follow the Hudson's principles they will preserve the friendship of buyers by treating them with every courtesy after buying. The idea is to kill that spirit of well-I've-sold-him-a-car-now-I-don't-have-to-bother-with-him-any-more. New motorists will find increased pleasure in owning cars when the Hudson's service department will have inculcated its spirit into the relations of all dealers and consumers. Frank H. Trego has charge of the Hudson service department. Mr. Trego has a staff of mechanics scattered all over the country whose sole duty is to instruct dealers and owners how to get the utmost of service out of their cars.—Hudson Motor Car Co.